

to the stars

ad Astra

THE MAGAZINE OF THE NATIONAL SPACE SOCIETY

APRIL/MAY/JUNE 2004

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SAILING TO SATURN

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Presented by the National Space Society 

May 27–31, 2004
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Oklahoma City National Memorial (Murrah Building bombing memorial)
Omniplex Museum Complex (includes planetarium, space & science museums)

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Nightfall on Titan seas, as imagined by Slovenian artist Gregor Kervina. Saturn's largest moon is a primary focus of the Huygens-Cassini mission, scheduled to begin in July. The image depicts the Huygens probe floating in a methane/ethane lake believed to exist beneath the hazy atmosphere of Titan. Photo: NASA

AD ASTRA, which means "to the stars" in Latin, is the motto of the National Space Society, an international membership group dedicated to furthering the exploration and development of space. Our quarterly magazine, **AD ASTRA**, is only one of many NSS activities aimed at creating a space-faring civilization. For more information on NSS call (202) 429-1600 or visit www.nss.org on the internet.

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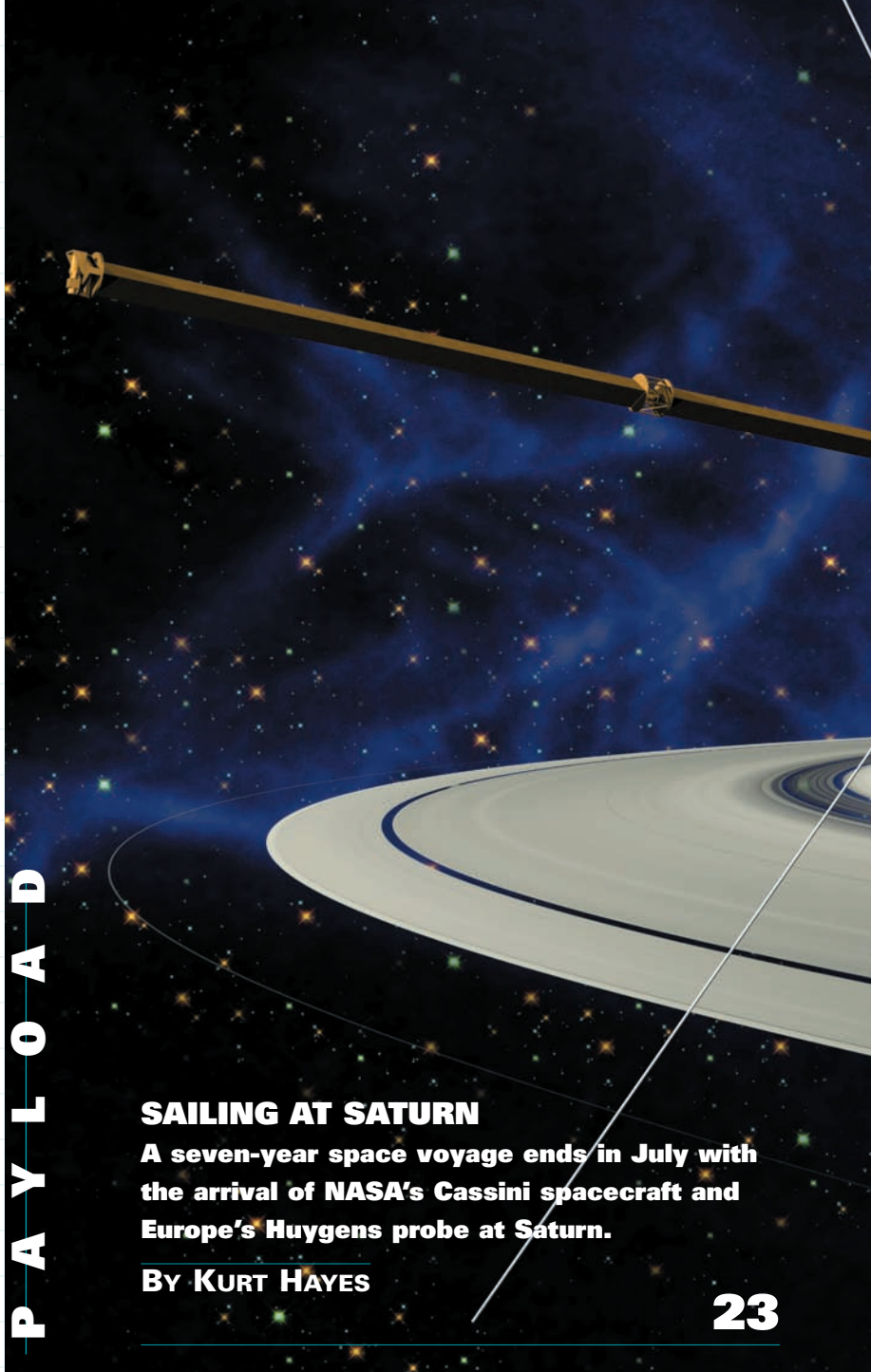
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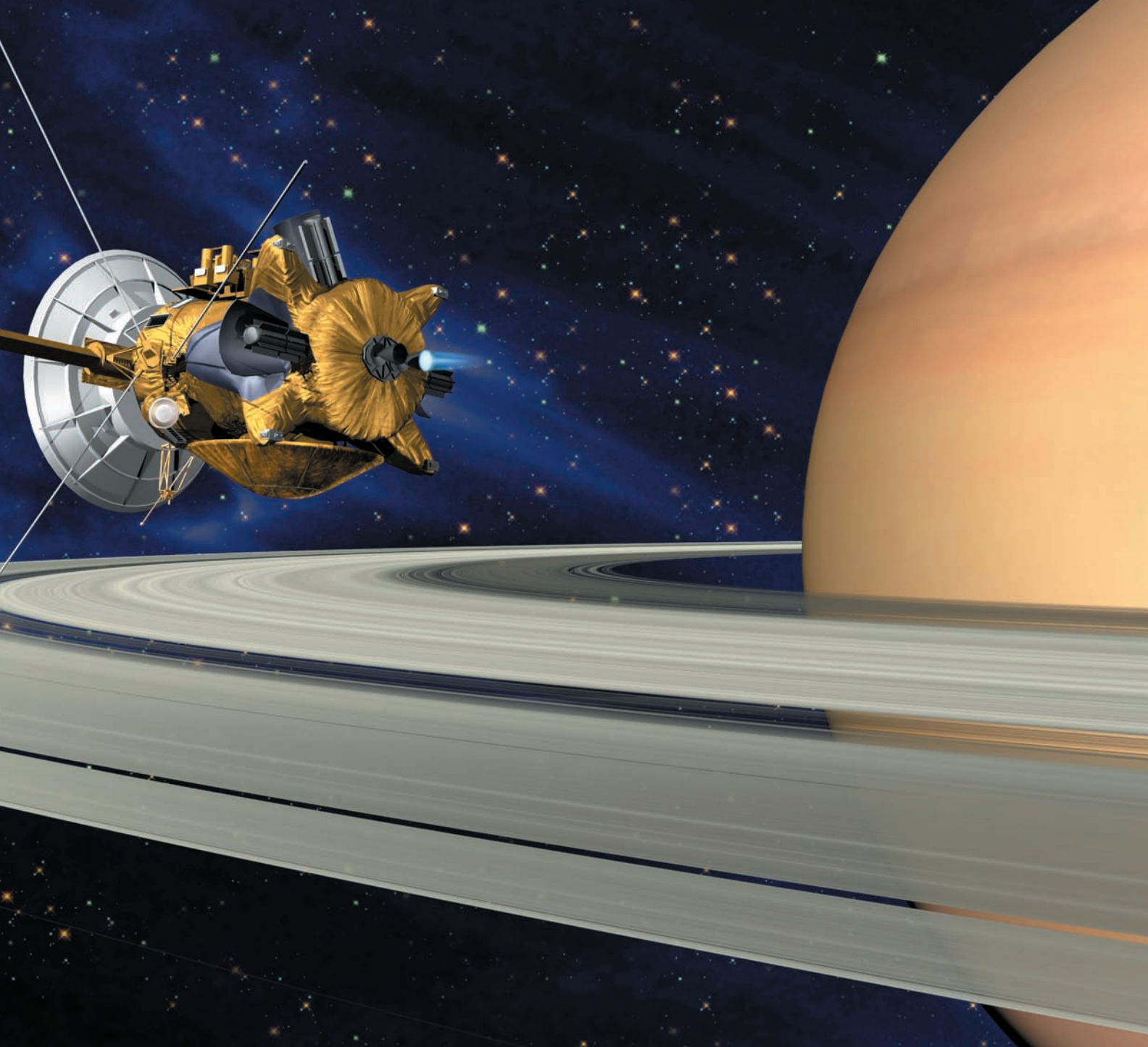
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National Space Society

1620 I Street NW
Suite 615
Washington, DC 20006
(202) 429-1600
www.nss.org

George T. Whitesides
Executive Director

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Publisher
National Space Society

Editor-in-Chief
Irene Mona Klotz

Senior Contributing Editor
John Kross

Copy Editor
Jonathan Aretakis

Photographer
Joe Marino

Art Direction and Graphic Design
Leonard D. Righter
Andrew S. Ladson

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FIGHTING FOR THE FUTURE

We now have a real chance to transform our dream into reality. Problem is—we are going to have to fight for it. We may not get another chance in our lifetime. We have to fight hard now for our vision.

NASA's plan in response to the Bush challenge is not perfect. There is much to do and little to do it with. Many argue endlessly over how to do it. That is not our main concern. Our focus should be on winning Congressional approval and sufficient funding to initiate the new plan now at the levels laid out by the Bush administration. We can fine-tune the details in 2005. If we lose this fight now, forget about how to do it in 2005. If not approved, it is unlikely a president will offer such ventures for far too many years.

My research concerning 'Peak Oil' indicates that the economy of no nation may be able to support an initiative of this scale a generation from now. Peak Oil can be thought of as the point at which global demand exceeds global supply. Indicators are beginning to look less than spectacular in this regard. The immediate problem is not running out of oil; it is that prices would skyrocket. World economies would be under great stress. Some indicate we could begin to slip down this slope as early as 2007. Then it may already be too late.

The development of alternative energy sources (Earth- or space-based) capable of supplanting our demand for oil could take trillions of dollars and decades to develop and field. Yes there are concepts for tapping 'off-world' resources as a relief valve to enable the expansion of economies beyond Earth's fixed resources. For this to happen we must begin now to explore our options for employing space toward those ends. First we have to develop the infrastructure and then go there to explore the possibilities. The luxury of time may not be ours to risk.

The global energy situation is just one of many reasons it is urgent we start this endeavor of taking our species beyond Earth immediately. There are others, such as getting all of our eggs out of one basket to avoid the plagues of "bio-error" and bio-terror, and planetary defense. One that resonates with the public is to inspire our young people with a dream of hope for our future.

The administration's plan does not establish off-world energy sources, planetary defense, nor off-world safe havens for humanity. What this plan does is start the process. One cannot run a marathon without taking that first step. If we don't take up the fight now, the finish line may never be in sight.

I urge you to join the effort right now. What can you do?

1. Sign up for the 2004 NSS Legislative Conference on our website at: <http://www.nss.org/legislative/index.html>.
2. Sign up for the 2004 ISDC at <http://www.isdc2004.org/>.
3. Join your local chapter (see back of this issue) or go to <http://www.nsschapters.org/allnsschapterlist.html>. Chapters will be supplied with a resource kit currently under development by the NSS Policy Committee geared toward promoting this new vision.
4. Sign up for the Political Action Network (PAN). The PAN will feature a WWW resource center, e-mail alerts, and direct old-fashioned follow-up phone calls for a personal touch when released later this year.

Join with us in promoting our dream of taking humanity to the stars.
Ad Astra!



Greg Allison
Chairman of the
NSS Executive
Committee

Greg Allison

MISSION CONTROL

spacebeat
BY JOHN KROSS

orbiter update

LUNA REGAINS THE SPOTLIGHT

Hard on the heels of President George W. Bush's recently announced space exploration initiative, NASA's Goddard Space Flight Center has been given the green light to lead a robotic lunar mission in 2008.

For many years, Earth's closest neighbor was neglected, save for NASA's Lunar Prospector and the Pentagon's Clementine missions. But like a returning sweetheart from NASA's youth, the moon now holds renewed allure with water ice the latest object of desire. The Lunar Reconnaissance Orbiter could wield a powerful radar to scan permanently darkened craters in search of water ice trapped at the moon's poles. A number of fast-track approaches are being reviewed at the Greenbelt, Md., center to build the lunar orbiter. A follow-on robotic lunar lander also is slated for 2009.



NASA / APOLLO 16

The Bush-inspired initiative anticipates a human return to the lunar surface could happen by 2015, and no later than 2020.

mission control space beat

The Bush-inspired initiative anticipates a human return to the lunar surface could happen by 2015, and no later than 2020. In re-energizing NASA's moon program, the White House envisions lunar exploration as a means to mature new technologies and systems, including use of in situ resources, in order to support a sustained human presence beyond low Earth orbit.

A RUSSIAN SIX-SEATER

The traditional Russian welcome of bread and salt might have been missing, but most observers warmly greeted news that Russia is developing a new manned vehicle with a reusable capsule twice as large as the current model Soyuz.

"Space construction firm RKK Energia is working on a project to build a vessel with a reusable capsule, weighing 12 to 14 [metric] tons—about twice as large as what we have now. It could accommodate six people at a minimum," said Yuri Koptev, head of the Russian space agency.

The beefed-up Soyuz capsule and a new booster based on the workhorse Soyuz rocket also would boost the capacity to carry supplies. "Due to its new engine and extensive use of hydrogen, the new rocket will have a payload practically equaling...that of the Zenit rocket," said Koptev. Zenit can carry 15 metric tons.

Koptev wouldn't say how long it could take to build the spacecraft or how much it would cost. He did say that Energia had done a lot of work on the new vehicle already. "It has already reached a serious project stage while the Americans are only talking about their spacecraft,"

Koptev said, referring to US plans to build a new spacecraft.

Presumably, the six-seater Soyuz could rival the proposed U.S. Crew Exploration Vehicle, which is set to make its first manned mission no later than 2014. At a minimum, the new Russian vessel could fill the gap between the phaseout of the shuttle and the debut flight of the Crew Exploration Vehicle.

The Rosaviakosmos chief said that Russia and other partners in the 16-nation International Space Station program were waiting for the United States to clarify how the orbiting outpost would be run after 2010 when U.S. space shuttles are retired. Koptev said that Russia would be willing to offer its Soyuz spacecraft to ferry astronauts to and from the station, but that would require renegotiating the original documents on the station.

Meanwhile, negotiations with the European Space Agency has led to a controversial move to launch Soyuz rockets from the equatorial Guiana Space Center starting in 2006. ESA's ruling council finally gave the nod to a 223-million-euro investment in the Soyuz launch pad initiative, with an additional 121 million euros from the Arianespace launch consortium.

Some see the ESA-Soyuz initiative as opening the door to broad cooperation with Russia on future launch vehicles and possible human spaceflights from the South American launch complex. But skeptics see the deal as a proverbial Trojan horse that will siphon business away from Arianespace.



HUBBLE DIGS DEEPLY TOWARD BIG BANG [03.09.04] PHOTO CREDIT: NASA/ESA/S. BECKWITH (STSCI) AND THE HUDF TEAM.

An estimated 10,000 galaxies are revealed in humankind's deepest portrait of the visible universe. Using NASA's Hubble Space Telescope, new images reveal some of the farthest galaxies ever seen, when the universe was just 400 million years old. Called the Hubble Ultra Deep Field, the view represents the deepest portrait of the visible universe ever achieved by humankind. The snapshot reveals the first galaxies to emerge from the so-called "dark ages," the time shortly after the big bang when the first stars reheated the cold, dark universe. The new image should offer new insights into what types of objects reheated the universe long ago.

This historic new view is actually two separate images taken by Hubble's Advanced Camera for Surveys (ACS) and the Near Infrared Camera and Multi-object Spectrometer (NICMOS). Both images reveal galaxies that until now were too faint to be seen by ground-based telescopes, or even in Hubble's previous faraway looks, called the Hubble Deep Fields, taken in 1995 and 1998. "Hubble takes us to within a stone's throw of the big bang itself," says Massimo Stiavelli of the Space Telescope Science Institute in Baltimore, Md., and the Hubble Ultra Deep Field project lead.

EYES ON THE PRIZE

The U.S. space agency has decided to dip into the kitty and offer cold hard cash—to the tune of \$20 million a year for the next five years—as part of an effort to spark technological innovation.

“We want to stimulate people we normally don’t reach,” said program head Brant Sponberg. “We expect to have people coming out of left field and we think they’ll have solutions from out of left field too.”

The inspiration behind the project, called the Centennial Challenge, comes from the early days of aviation development when cash rewards drove explorers and inventors into the air. The most famous of these prizes was the Orteig Prize, awarded to a young pilot named Charles Lindbergh for the first New York to Paris transatlantic flight. Lindbergh collected \$25,000 for his efforts.

A similar competition is under way by the privately funded X Prize Foundation for the first team that builds and flies a manned reusable suborbital rocket twice within two weeks.

The NASA program will eschew specific destinations and instead accent key technological breakthroughs, such as nanotechnology and long-duration batteries. A privately funded lunar robot is a likely theme for one of the first contests, and a network of rovers and solar sails are other possibilities. “One perception within the agency is that this was going to be the Academy Awards of aerospace,” said Sponberg, “but this is not going to laud past accomplishments. It’s going to set up new ones. This challenge is

intended to produce hardware or trigger key discoveries.”

While specific contest criteria and rules are under development, NASA is clear about the program goals. “There are some things that we do that are so tough, we want to open it up ... and let the competition decide what’s best, rather than prejudging. We think this will be a good way to stimulate innovation and solve some of the challenges we will be facing in exploration,” said Sponberg.

NASA has not yet begun to dole out the \$20 million largess, but a survey of NASA field centers last year turned up more than 140 prize ideas. A workshop this spring is expected to foster additional concepts, and industry partners may kick in additional prize money for worthy ideas. “What we’re doing is really a test program,” said Sponberg. “If it works, it will become another mechanism for funding projects.”

HUBBLE’S TROUBLES

NASA is halting all space shuttle missions to service the Hubble Space Telescope—a move that is expected to put the orbiting observatory out of action within four years. The shuttle

orbiters that maintain Hubble are being retired in 2010 under President Bush’s new initiative, which focuses on exploration beyond low-Earth orbit. Servicing missions to the Hubble are required every few years to replace worn-out parts. “This is a sad day,” said NASA’s chief scientist John Grunsfeld, but it is “the best thing for the space community.”

Hubble has revolutionized the study of astronomy since its launch in 1990, sending a steady stream of striking images back to Earth. The announcement that the Hubble would be left to degrade comes as astronomers using the telescope revealed a new image of the deepest view ever of the cosmos, detecting the youngest and most distant galaxies ever seen.

Shuttle servicing flights to Hubble have been halted since the explosion of shuttle Columbia in February 2003, delaying replacement of the telescope’s ailing gyroscopes. Without such maintenance, Hubble could continue to operate until 2008, but there are no guarantees.

NASA plans to deorbit the telescope by flying and autonomously

attaching a \$300-million upper-stage motor to guide re-entry to a remote spot in the ocean, a sad end for an observatory that has captured almost a half-million images of more than 25,000 astronomy targets.

Meanwhile, the Space Telescope Science Institute is revising Hubble observing plans to focus on higher priority targets before Hubble’s demise. “We will get as much life as we can out of the Hubble telescope, and we will continue to support research and analysis even after re-entry,” said Grunsfeld.

NASA said it plans to offer two Hubble science instruments, which had been slated to be installed during the next servicing mission, to the astronomical community for other projects.

NASA says it is just too risky for shuttle astronauts to fix the Hubble, which means an early death for the world’s premier astronomical eye in the sky. Others disagree. “The final planned HST servicing mission, SM4, will be at least as safe as shuttle flights to the International Space Station,” wrote a NASA engineer in one of two reports that began circulating in February.

The other report argues that missions to Hubble would have the same



NASA decides to keep its hands off Hubble.

ability as those to the station to deal with damage to the shuttle's thermal protection system. "I hope very much that NASA will reconsider this decision [to abandon Hubble]," said institute director Steve Beckwith.

Regardless of Hubble's fate, NASA already is planning to replace the orbiting observatory with a new improved telescope in 2011. NASA has tapped TRW/Ball Aerospace to build the successor to Hubble called the James Webb Space Telescope.

The next generation observatory will be able to look deeper into the universe because of the increased light-collecting power of its larger mirror and the extraordinary sensitivity of its instruments to infrared light. Webb's primary mirror will be more than six meters in diameter, providing much more light-gathering capability than Hubble's primary mirror.

The new telescope will also carry a near-infrared camera, a multi-object spectrometer, and a mid-infrared camera/spectrometer. Under the terms of the contract, valued at \$824.8 million, TRW will design and fabricate the observatory's primary mirror and spacecraft. The company will also integrate the science instrument module as well as perform pre-flight testing and on-orbit checkout.

Following launch and a three-month coast, the Webb Space Telescope will reach its operational orbit 932,000 miles from Earth, at the L2 Lagrange Point, where the telescope will lie balanced between the gravity of the sun and Earth.

DART HITS THE BULLS-EYE

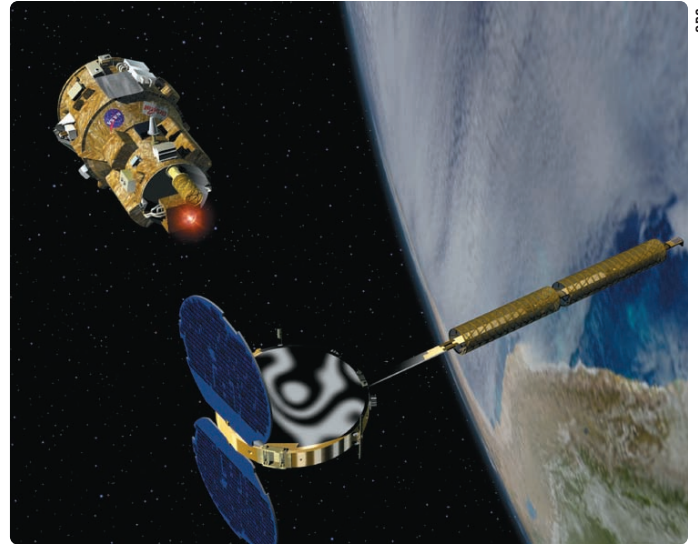
NASA continues to meet critical milestones in the development of the DART (Demonstration for Autonomous Rendezvous Technology), a flight demonstrator vehicle designed to test technologies required to locate and autonomously rendezvous with other spacecraft. The DART mission provides a key step in establishing autonomous rendezvous capability for the United States.

Developed by Orbital Sciences Corp., the DART will be launched on a Pegasus rocket from an L-1011 jet aircraft. Once launched, it will travel from a parking orbit to rendezvous with, or maneuver close to, a target satellite. The entire mission will be performed without a human pilot.

DART is the first of three flight-testing demonstrators for the former Orbital Space Plane (OSP) program—a NASA-wide initiative that was intended to develop a crew rescue and transfer vehicle to and from the International Space Station.

Other demonstrators intended for the OSP program include the X-37 flight demonstrator developed by Boeing, and the Pad Abort Demonstration (PAD) demonstrator developed by Lockheed Martin Corp.

NASA recently tested rocket engines and parachutes that will pave the way toward a series of integrated PAD flight tests in 2005. The pad abort tests are aimed at developing a system that could pull a crew safely away from an aborted launch if needed. Knowledge gained from the tests will reduce future design and development risks of a launch escape system used for the OSP or,



Artist's illustration of DART spacecraft.

presumably, other manned vehicles, like the Crew Exploration Vehicle, proposed as part of President Bush's new space initiative.

"PAD is the first launch pad crew escape system NASA has developed since Apollo," said Chuck Shaw, PAD project manager at the Johnson Space Center. PAD engine and parachute tests followed successful vehicle wind tunnel tests in September. A series of 14 hot-fire tests of a 50,000-pound thrust RS-88 rocket engine were conducted in November and December, resulting in a total of 55 seconds of successful engine operation.

For the initial flight test in mid-2005, the PAD will consist of a mock crew escape module mounted on a propulsion module. Flight tests will use instrumented mannequins to measure the conditions a human crew would experience. Later integrated launch abort demonstration tests will use four RS-88 engines to separate a test vehicle from a test platform, simulating an aborted launch. Four 156-

foot parachutes will deploy and carry the vehicle to landing.

SPACE BILL ADVANCES

A bill to promote the development of the fledgling commercial human spaceflight industry was passed by House of Representatives in March.

The Commercial Space Launch Amendments Act of 2004, which establishes regulatory oversight for the industry, was moved to the Senate for consideration.

"I have come to see this as one of the most important measures this committee will move this year," said House Science Committee Chairman Sherwood Boehlert (R-NY).

"This is about a lot more than 'joy rides' in space, although there's nothing wrong with such an enterprise. This is about the future of the U.S. aerospace industry," he said in a statement.

"As in most areas of American enterprise, the greatest innovations in aerospace are most likely to come from small entrepreneurs. This is true whether we're talking about

launching humans or cargo. And the goal of this bill is to promote robust experimentation, to make sure that entrepreneurs and inventors have the incentives and the capabilities they need to pursue their ideas," Boehlert said.

The bill, which is strongly supported by the National Space Society, stipulates that the Federal Aviation Administration's Office of Commercial Space Transportation is responsible for regulating the flights of all commercial space vehicles, including those

transporting passengers, and makes it easier for rocket developers to obtain permits to fly their ships.

It also extends government indemnification for the entire commercial space transportation industry, including licensed, non-experimental commercial human space launches, for a period of three years. Legislators want a study to assess how to best eliminate indemnification for the industry by 2008.

Dennis Tito, the world's first space tourist, added his support for the bill, too. "H.R. 3752 is precisely the kind of legislation Congress should enact in order to give investors like me confidence that our space tourism ventures will be regulated in a fair and streamlined manner. I hope the Senate takes up this bill soon and sends it on to President Bush for his signature."

IMAX DOES APOLLO

With its eyes back on the moon, NASA inked a deal with a production company owned by actor Tom Hanks, Lockheed Martin and IMAX, for a new 3-D space flick called "Magnificent Desolation."

Bouyed by the success of IMAX's successful "Space Station," which grossed more than \$70 million, the new production will take armchair astronauts to the moon and alongside the Apollo spacewalkers as they explore the Ocean of Storms, the Fra Mauro Highlands, the Sea of Tranquility and the Taurus Littrow Valley.

The film will be jointly designed by Playtone—a production company run by Hanks and Gary Goetzman—and IMAX to play at both commercial and IMAX theaters. ↪



TITAN REIGN ENDING

One of the military's last Titan 4 rocket's blasts off from Cape Canaveral Air Force Station on Feb. 14 to place a missile-warning satellite into orbit. The heavy-lift booster began flying in 1989.

visit www.nss.org today!



Ad Astra



The National Space Society's vision is people living and working in thriving communities beyond the Earth. NSS members promote change in social, technical, economic, and political conditions to advance the day when people will live and work in space.

Join the vision. Become a member!

The Latest from the National Space Society

THE RIGHT STUFF LIVES AGAIN: NSS lauds the first Mach 2 flight by a private piloted rocket vehicle and granting of the first private spaceship license by the FAA.

WASHINGTON, DC – National Space Society Executive Director George Whitesides issued the following statement on two milestones in space history: the announcement on April 7 by the Federal Aviation Administration that it had issued the first license for a "sub-orbital manned rocket flight" to Burt Rutan's Scaled Composites of Mojave, CA, and the news that the very next day, on April 8, Rutan's newly licensed vehicle SpaceShipOne had reached Mach 2 and over 100,000 feet in its second successful powered flight.

Quick Links



ORBITER UPDATE: NASA DELAYING LAUNCH OF FIRST POST-COLUMBIA MISSION

DISCOVERY NOW RESERVED FOR THE AGENCY'S CLOSELY WATCHED RETURN-TO-FLIGHT; ATLANTIS WILL BE ON STANDBY.

NASA is delaying launch of its first post-Columbia mission to no earlier than March 2005. The six-month slip in the shuttle's target launch date is due to a spate of technical problems and new restrictions for launching during daylight for photography requirements.

NASA also has decided to switch orbiters, with Discovery—tapped for the first post-Challenger mission also—now reserved for the agency's closely watched Return-to-Flight.

Deputy Associate Administrator Michael Kostelnik said the biggest problem facing engineers is finding ways to make sure the foam insulation on the shuttle's external fuel tank does not fall off during launch. A suitcase-sized chunk of foam fell off Columbia's tank during launch and hit

the left wing. NASA was unaware how extensive the damage was until the shuttle was destroyed during its return to Earth 16 days later. The seven crewmembers aboard the shuttle were killed.

NASA has pledged to implement all the recommendations of the Columbia Accident Investigation Board and had hoped to complete the work in time for a September liftoff of shuttle Atlantis to resume servicing and construction of the International Space Station.

Although engineers have redesigned the area where insulation broke off and doomed Columbia, other locations on the 15-story external fuel tank have surfaced as a concern.

NASA's options for post-Columbia



Rescue workers lower a volunteer stand-in astronaut from the top of a mockup of the orbiter crew compartment during an emergency landing simulation at the Kennedy Space Center. The simulation tests emergency preparedness personnel, equipment and facilities in rescuing astronauts from a downed orbiter and providing immediate medical attention. Rescuers had to remove the crew, provide triage and transport the injured to hospitals for further treatment.

flights are restricted to daylight launch opportunities to ensure ground cameras have a clear view of ascent. Investigators determined that the lack

of information about the debris strike hit contributed to managers' mistaken conclusion that the impact posed no risk to Columbia and its crew. The daylight launch restriction, however, further limits NASA's launch opportunities.

The agency also plans to have a second shuttle and crew ready for launch in case a problem with Discovery prevents the astronauts from returning home aboard the ship. As part of post-Columbia mandated safety procedures, the space station is to serve as a lifeboat for shuttle crews in case of emergency.

The rescue crew, which would fly on shuttle Atlantis, would be comprised of up to four astronauts already in training for the third post-Columbia mission. 📌



STS-114 astronauts Andy Thomas, left, and Soichi Noguchi check out equipment they will be using during their visit to the International Space Station next year.



Workers disassemble the solid rocket booster stack for the STS-114 mission. Some of the segments were returned to check the solid fuel and verify the life-expectancy of the stacked segments.

FUTURE EARTH PROSPERITY WILL DEPEND ON RESOURCES IN SPACE

BY MARK HOPKINS

THE LATE PRINCETON PHYSICS PROFESSOR GERARD O'NEILL first published his ideas concerning the construction of space settlements in a now classic *Physics Today* article in 1974. His ideas led to the establishment of the L5 Society, which in 1987 merged with NSI to create the present National Space Society. What has come to be known as an O'Neill space settlement consists of a large cylindrical shell several miles long and a few miles wide, which is built in space, primarily from materials found in space.

The shell is spun to create the effect of normal Earth gravity and its interior is filled with what constitutes a normal Earth atmosphere. A system of windows and external mirrors brings sunlight into the cylinder in a fashion that approximates daytime on Earth. The insides of the cylinder are molded to create a highly desirable living area complete with fields, forests, hills, streams, lakes, towns, etc. This amounts to land built in space.

The asteroids have sufficient material of roughly the right composition to build O'Neill space settlements with a combined land surface area of more than 1,000 times the land surface area of Earth. If you digest the moons of the outer planets, then the land area that could be created is increased by two orders of magnitude (a factor of 100.)

Beyond Pluto there exists the Oort Cloud of comets that circle the sun in orbits which taken together comprise a large sphere. Six trillion is the current estimate of the number of these comets. They extend outward from the sun for three light-years in all directions. They have enough mass to increase our total land area estimate that can be built via O'Neill settlements by substantially more than another order of magnitude (factor of 10.)

Thus there are enough material resources in the solar system (not counting the planets) to create land equal to more than one million times the land area of Earth. This is a very large number but, compared to the energy resources of the solar system, it is tiny. The sun produces more than 10 trillion times the amount of energy currently used by humanity.

Nor need it stop with the solar system. Other stars may well have similar Oort Clouds. Let's assume this is the case with the Alpha Centauri system, the center of which is 4.35 light-years from the sun. If that Oort Cloud has a radius of three light-years (gravitational considerations suggest it's modestly larger) and our Oort Cloud has a radius of three light-years, then the clouds overlap creating a star bridge between the stellar systems. Any civilization that spans our Oort Cloud also will expand into the Alpha Centauri Oort Cloud. Jumps to the Oort Clouds of other stars will likely follow. In terms of land area, it is trivial but still interesting to note, that one of the stars in the Alpha Centauri system is remarkably similar to the sun and is considered to be a good candidate to have an Earth-like planet.

Why is all of this important in a big picture sense? The average American has a per capita income that is seven times greater than that of the human race as a whole. Poverty is defined in America to be substantially above human average income. This is the human average we are making comparisons with – not poor people by human standards.

Even if we assume no further population increase and no further increase in America's per capita income, then the human economy must increase seven times in order to raise the human average to what Americans now enjoy. Where are we going to get the resources to do anything like this? In actuality, the population is increasing. American per capita income is rising and desirably so. The environment needs to be improved – not get worse. All of which makes the problem more difficult. What is the solution? The answer lies in space.

Mark Hopkins currently serves as the secretary of the National Space Society. He is a former Rand Corp. economist and has degrees in economics from Harvard and the California Institute of Technology.

The vast majority of the resources of the solar system are in space – not on Earth. One way to grasp the significance of this point is to ask how much land area could these resources produce, if they were dedicated to the construction of O'Neill space settlements?

A HORNET'S NEST

FRESH ON THE HEELS OF A LONG-AWAITED PRESIDENTIAL directive for the country's human space program came a dose of stark reality. NASA, doggedly working to return the shuttle fleet to flight, came to the conclusion that an additional Hubble Space Telescope servicing mission would not meet the criteria for post-Columbia safety standards within the agency's resources—three shuttles instead of four—and overall priority—finishing the International Space Station before the shuttles are retired in six years.

The backlash was swift, harsh and, at times, personal, as NASA administrator Sean O'Keefe took sole responsibility for pulling Hubble's life-extension system. No one rejoiced at the thought of losing such a valuable, productive and beloved instrument, which continues to stun us with mind-bending views of our universe. But, like a good parent, decision-makers can't always make the popular choice.

Among NASA's most outspoken critics is Mars settlement advocate and author Robert Zubrin. I was a bit surprised by Bob's offer to write about the Hubble issue for *Ad Astra*, not seeing at first what the loss of a telescope had to do with his passion for extending humanity's presence onto Mars. But he won me over with a compelling point: If we don't have the stomach to risk a mission to Hubble, how are we possibly going to send people to the moon and Mars where the risk to human life will be far greater and much less defined. Zubrin's commentary begins on page 16. We've also included the summary of a position paper NASA wrote to explain its decision.

Joan Johnson-Freese, a noted space policy expert who teaches young military minds to challenge assumptions and to think outside the box, writes about the opportunities proffered by the new

BY IRENE MONA KLOTZ, *EDITOR IN CHIEF, AD ASTRA*

moon-Mars initiative, especially for international relations, and reminds us that the country's dominance in space sets the agenda for the rest of the space-faring world, with the notable exception of China. We also offer a view of space exploration from the Democratic perspective and finally, science writer Larry O'Hanlon explains why scientists want to go back to the moon.

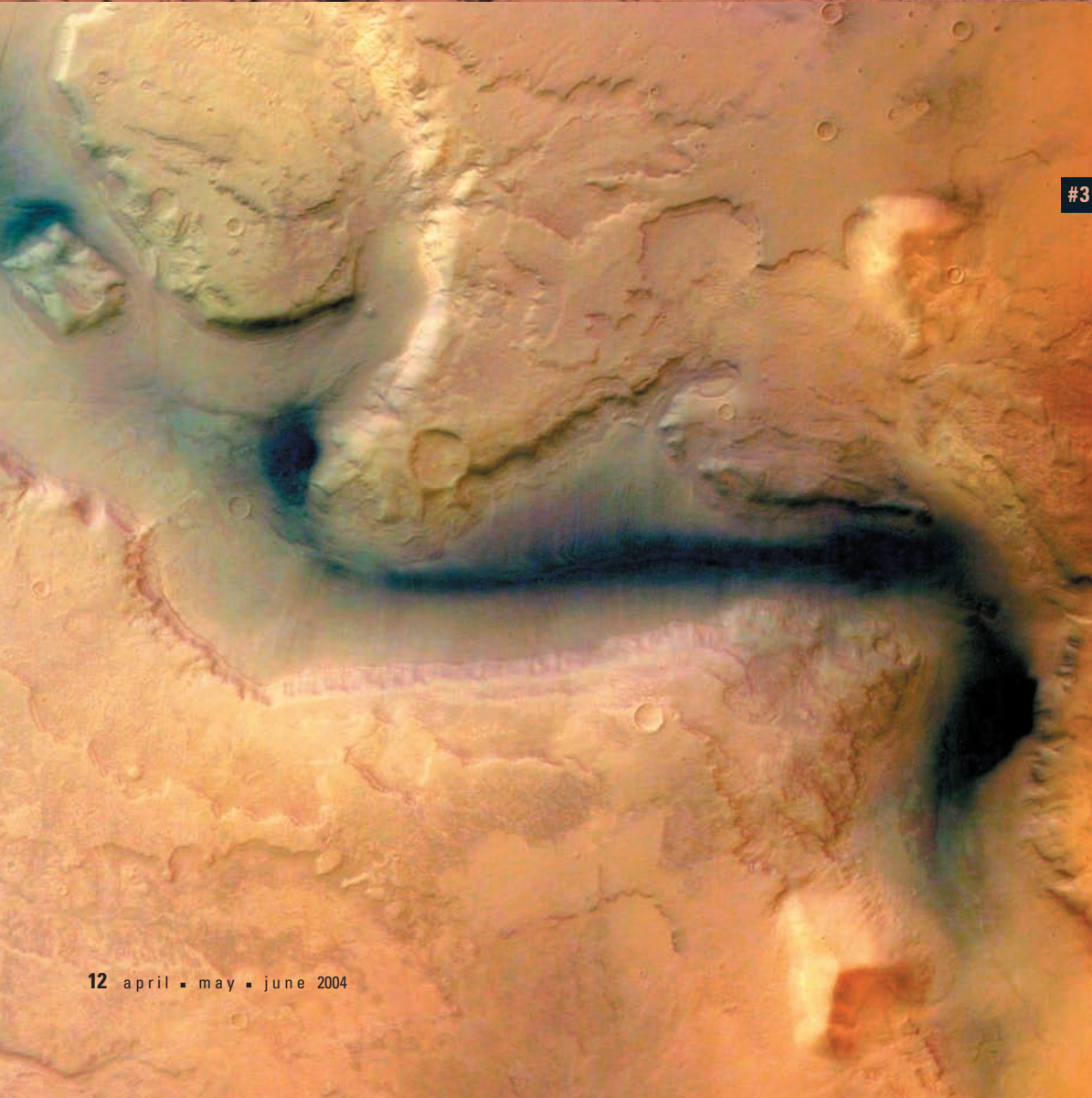
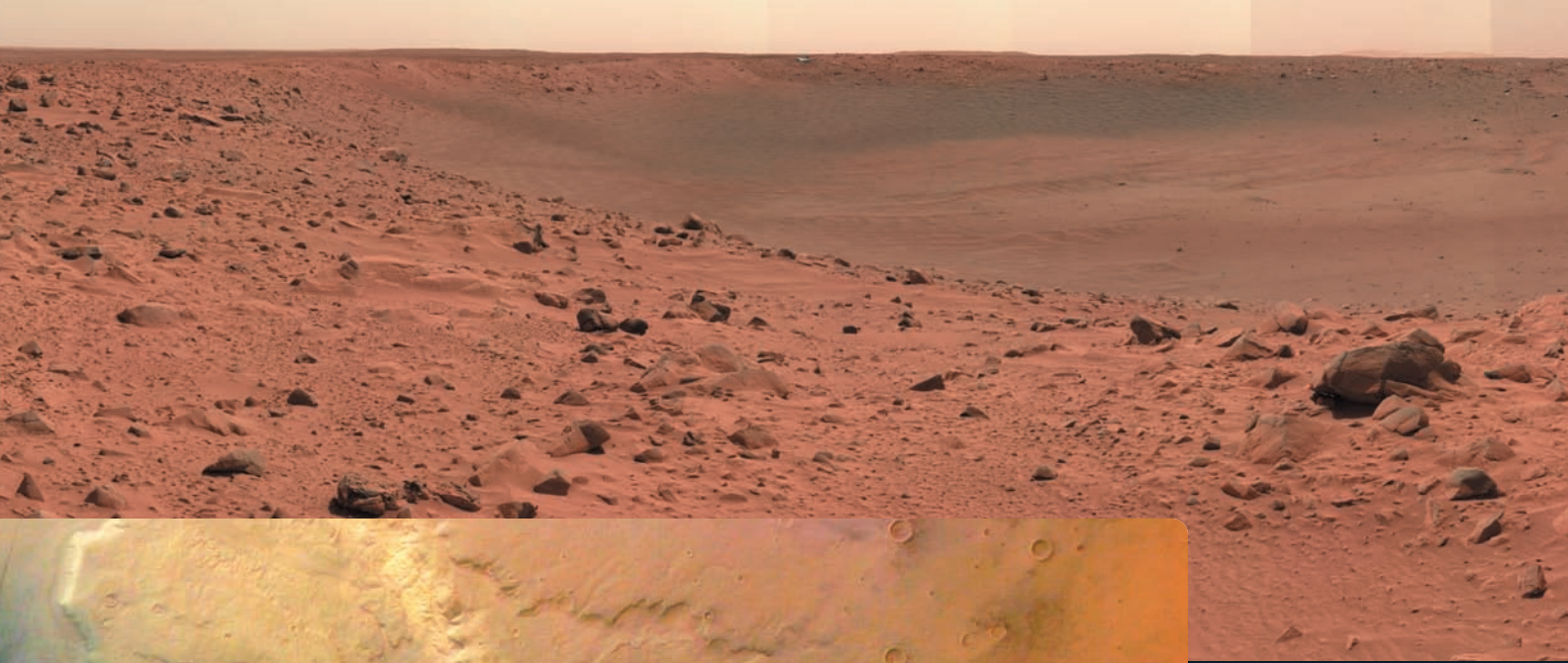
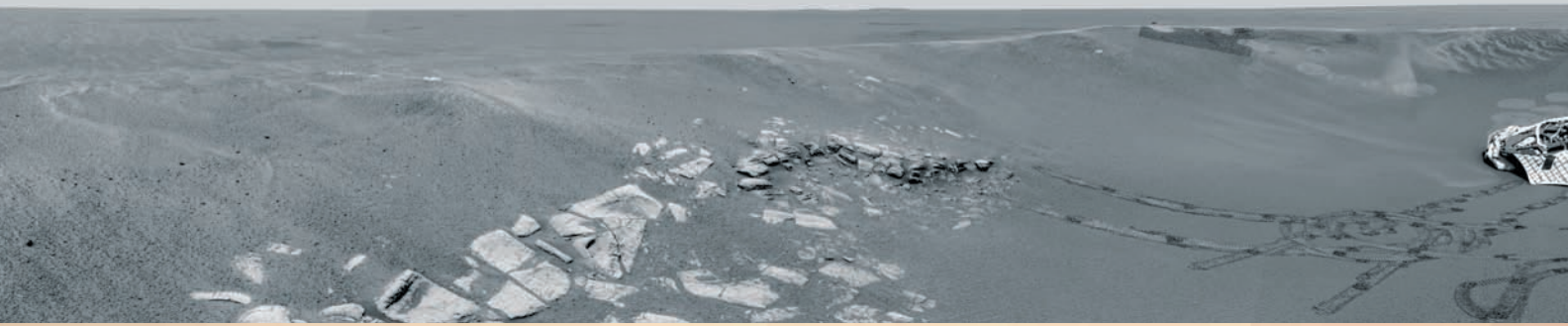
Lest we become so focused on trees we forget the forest, writer Kurt Hays highlights a spectacular adventure about to begin. In July, after a seven-year cruise, the Cassini spacecraft and Huygens probe arrive at the gleaming jewel in our solar system, Saturn. A Cadillac of space probes, Cassini was built and launched long before NASA tightened its belt and began designing smaller, more focused science missions. Cassini, like Galileo's expedition at Jupiter, promises to rewrite what we know about Saturn and its entourage of rings and moons.

Even while the Mars Exploration Rovers continue to dig up secrets of Mars' watery past, scientists believe that elsewhere in our solar system a replica of primordial Earth is waiting to be discovered. Uncovering Titan, Saturn's largest moon and one of the most intriguing of all the planets' companions, will be the highlight of Cassini's partner probe, the European-built Huygens spacecraft.

In our Community section, NSS members and those interested in learning how to share the dream of space exploration will find updated and revised chapter listings that now feature cool, compelling and just plain fun chapter projects.

Ad Astra.





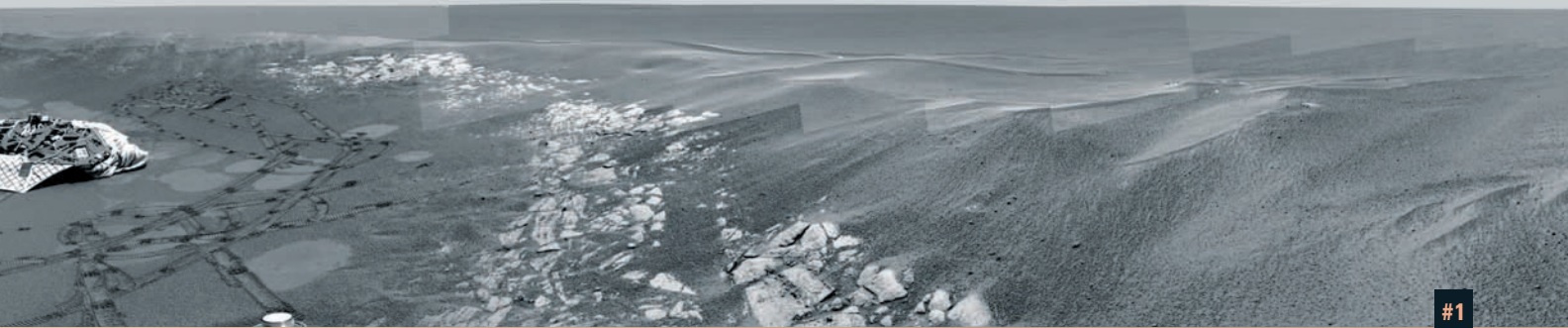
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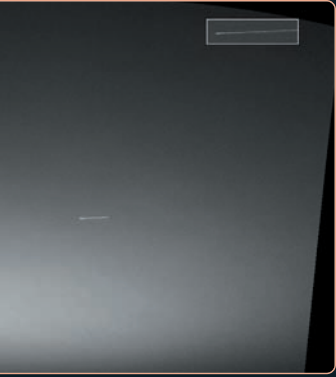


#1




#2

Eye on Mars



#1 New horizons: Opportunity, one of two rovers exploring Mars, takes a look back on its landing site, the Eagle crater. The rover has had a most remarkable mission so far, including uncovering chemical and physical evidence that the crater was once filled with a shallow, salty ocean capable of supporting life. Credit: NASA



#2 Heading for the hills: After an extensive survey of rocks and soils around its landing site, Spirit drove to the edge of a nearby crater for a look around. Scientists had hoped to find an exposed outcropping of bedrock, similar to what Opportunity studied, but Spirit's view from the edge of Bonneville crater showed nothing of the sort. Next stop for Spirit — provided its batteries and power systems hold out — is a group of hills more than a mile away that may show layers of rock. Credit: NASA

#3 View from above: While NASA's rovers scratch around in the Martian soil, Europe's Mars Express is collecting an impressive series of color and 3-D images from high above the planet's surface. Pictured here is an area east of the Hellas basin with a channel carved by what scientists believe was flowing water. Credit: ESA

#4 Extraterrestrial skywatching: The rovers spent several hours by night imaging the Martian skies. Among the pictures is this unusual streak shot, which could be a meteorite or possibly the flyby of a piece of Martian space junk: the Viking 2 orbiter. Credit: NASA

#5 Martian blueberries: One of the first and most intriguing discoveries by Opportunity was of tiny, spherical, hard objects that scientists nicknamed blueberries. It turns out the "blueberries" actually are laced with a mineral called hematite, which on Earth most often forms in the presence of water. Credit: NASA

Ditching Hubble bodes poorly for future space exploration

EDITOR'S NOTE: NASA's decision to end servicing missions to the Hubble Space Telescope has polarized the space community and the nation. On one side: safety concerns following the Columbia tragedy, and a desire to focus on space station construction. On the other: extending the life of a national treasure that has given humanity ring-side seats to the wonders of the universe. The debate boils down to relative risk and a question of choice. Author Robert Zubrin has been a strong voice among those opposing NASA's decision, which is encapsulated in a paper prepared by the agency in response to its critics. We welcome your comments on this debate and will publish your responses in our next issue.

BY ROBERT ZUBRIN

On Jan. 16, NASA Administrator Sean O'Keefe announced that he had decided to cancel all future space shuttle missions to the Hubble Space Telescope, including SM4, the nearly-ready-to-go flight that would have installed the new Cosmic Origins Spectrograph and Wide Field Camera 3 instruments.

This decision came atop an overall policy shift by the Bush administration to phase out the shuttle and International Space Station commitments by 2010, thereby clearing the way to redeploy their budgets toward supporting human exploration of the moon and Mars. While the general redirection of NASA's human spaceflight program from Earth orbital activities toward planetary exploration was a valuable and long-overdue step, canceling the Hubble upgrade mission was a mistake.

The Hubble Space Telescope has been the most scientifically productive spacecraft in history. Through Hubble, we have observed directly the planetary cometary impacts that drive the evolution of life, witnessed the birth of stars that make all life possible, and measured the size and age of the universe itself. Because of Hubble, we now know that ordinary matter is a very small part of the universe and that the expansion of the universe is speeding up, not slowing down as previously thought—thereby revealing a new and unexpected force of nature. The astronaut missions that have made this possible stand as epic achievements in the chronicles of humanity's search for truth.

A PRODUCTIVE FUTURE

Hubble is irreplaceable. The Webb Space Telescope planned for 2010 is an infrared device, and will not duplicate any of Hubble's capabilities in the optical or ultraviolet. Ground-based adaptive optics also only work in the infrared, and because they require bright guide stars, are limited in application to less than one percent of the sky. In contrast to these limited and yet-unproven systems, the Cosmic Origins Spectrograph and Wide Field Camera 3 designed to bring the Hubble to its full potential already have been built and tested at a cost of \$167 million, and promise an enormous scientific return immediately upon delivery to orbit.

With the help of these instruments, Hubble would be able to probe deeper into space and time, helping to reveal the processes

that governed the origin of the universe and that will determine its ultimate fate. Tasks that are on the immediate agenda include finding and obtaining precise measurements of very distant supernovae to help understand the nature of the "dark energy" that is causing the universe to accelerate, measuring the spatial structure of solar systems in the process of formation, observing galaxies in formation less than one billion years after the big bang, and studying the atmospheres of planets in other solar systems. How can the decision to terminate to abort such a program possibly be justified?

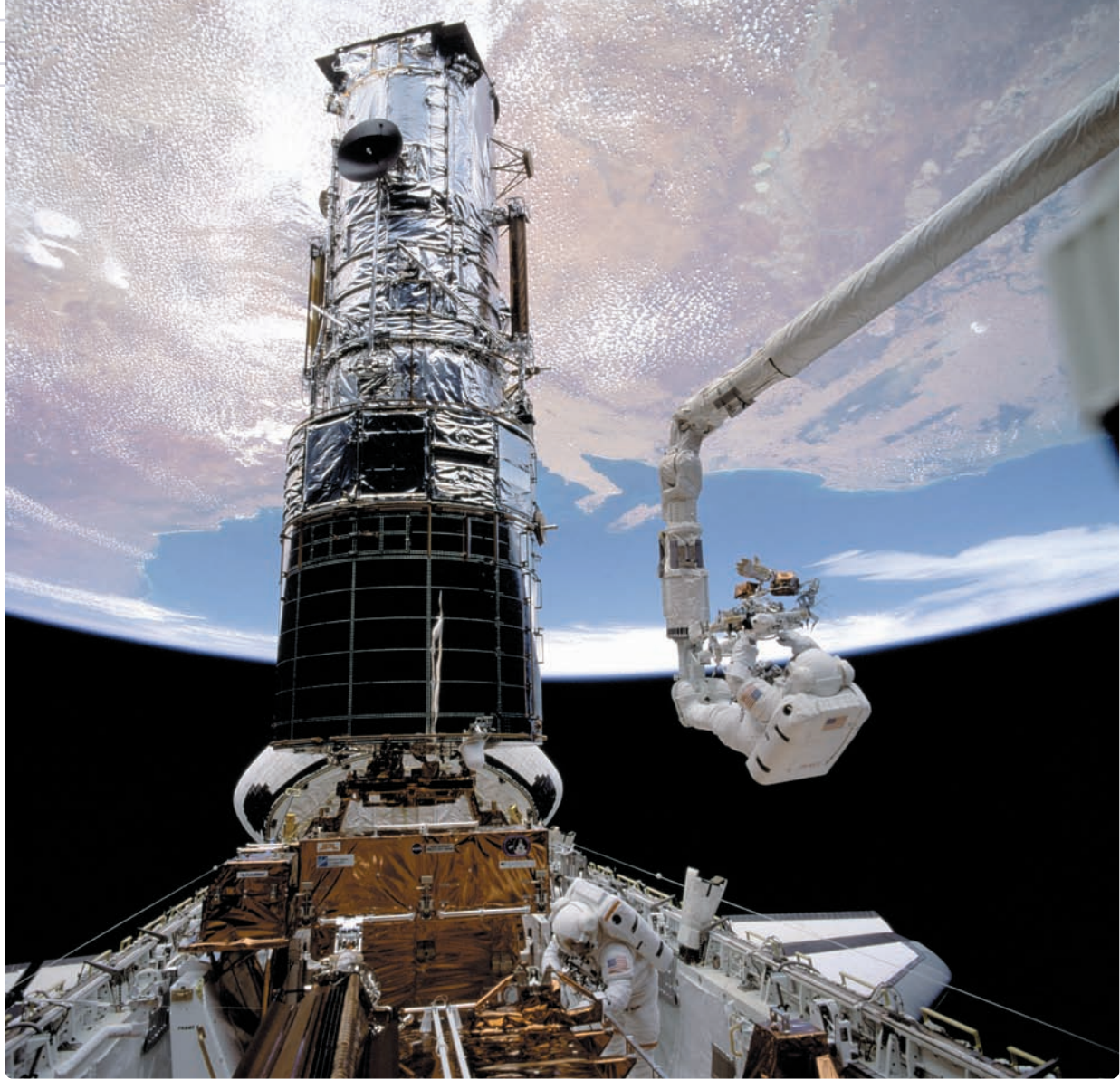
Certainly not on the basis of cost. If the Bush plan were to stand down the shuttle immediately, and save the \$24 billion required to operate it through 2010 so as to initiate the Moon/Mars program this year with substantial funding, that would be one thing. But given the decision to return the shuttle to flight, canceling the Hubble upgrade would only save a pittance.

It takes about \$4 billion per year to maintain the standing army of engineers and technicians that support the shuttle program, but it only costs an additional \$100 million or so to fly five shuttles in a given year instead of four. Thus the additional cost to the taxpayer to fly both SM4 and a subsequent flight a few years later to replace the Hubble's batteries and gyros and reboost it to a higher orbit where it could be functional well into the next decade would only be about \$200 million, or less than one percent of the shuttle program's budget over its remaining life. From a financial point of view, the decision to abandon the Hubble upgrade while continuing shuttle flights amounts to throwing out the baby while keeping the bathwater.

PLAYING IT SAFE

Safety arguments won't wash either; if the shuttle is safe enough to fly to the ISS, it's safe enough to go to Hubble. It is true that then that when flying to the ISS, the crew has a safe haven, so that if they should discover damage to the shuttle's thermal protection tile system, they could retire to the space station and survive for a short time while they wait for NASA or the Russian Space Agency to launch a rescue mission.

In this scenario, ISS missions would possess a safety features that Hubble missions lack. But tile damage during launch is not the



NASA

The Hubble Space Telescope during its first servicing mission in 1993.

only source of shuttle flight risk. According to most analysis, the greatest source of flight risk stems from the possibility of fatal impacts by micrometeor or orbital debris (MMOD). ISS orbits are much more hazardous in this respect than Hubble orbits. For example, on STS-113, the last shuttle station flight, the calculated probability of loss of vehicle and crew by MMOD was 1-in-250. In contrast, the last Hubble servicing mission (STS-109) had a much lower calculated MMOD probability of 1-in-414.

After MMOD, it is believed that the greatest risk faced by shuttle flights stems from the possibility of engine failure during launch. Because Hubble missions lift off with a much lighter payload than most ISS missions, they are able to deal with this danger much more effectively. For example, in order to be able to abort to orbit on an ISS mission such as STS-113 (Endeavour), all three shuttle main engines must fire for a full 282 seconds before one cuts out.

In contrast, on Hubble missions such as STS-103 (Discovery), only 188 seconds of full three-engine operation is required. This lower full-power time requirement for Hubble missions is a critical safety advantage, because the maximum time that either ISS or Hubble missions can attempt a Return to Launch Site (RTL) abort is about 232 seconds. Thus Hubble missions have a 50-second over-


lap during which either a RTL or orbital abort is possible, whereas ISS missions have a 50-second gap in which neither is possible.

If the shuttle cannot perform either an RTL or orbital orbit, it might be able to reach a transoceanic landing site, but in all probability will have to splash down in the ocean. When they depart the Cape, Hubble missions fly east-southeast, and they thus have the possibility to ditch in warm tropical waters. In contrast, ISS flights leave the Cape traveling northeast, and their crews face the bleak prospect of aborts into the frigid waters of the North Atlantic, where their chances for survival would be much less.

RELATIVE RISK

But there is another issue that makes the question of the comparative safety of shuttle ISS or Hubble missions almost beside the point. Just two days before O'Keefe announced his decision to abandon Hubble, President Bush delivered an address committing the nation to return astronauts to the moon and then move outward to Mars.

Can anyone believe that a human mission to the moon can be accomplished at lower risk than a shuttle mission to Hubble? Certainly not. To take just one example, consider the issue of



lunar descent and ascent. If a lunar excursion craft should have its propulsion system fail either during descent from orbit or ascent from the surface to orbit, it will crash, period. Since there is no air to slow the vehicle's descent, that's all there is to it. It is thus difficult to understand how a society that is too risk-adverse to undertake a shuttle mission to Hubble could possibly be serious in considering a mission to the moon or Mars.

The president intends to ask Congress to spend billions of dollars to develop technology to enable human Mars missions. Yet Congress has just spent \$167 million to develop the instruments for SM4, only to be told by NASA that it does not believe flying them is worth the risk to human life or the shuttle hardware. If such behavior is accepted, what guarantee can lawmakers have that after they spend billions to develop manned moon or Mars exploration hardware, NASA will stand firm on its pledge to fly them.

The decision to cancel the Hubble mission thus completely undermines the president's call for human planetary exploration. Unless we are willing to accept risks equal to, and in fact significantly greater, than those required to upgrade the space telescope, human explorers are not going to the moon, Mars, or anywhere else. And if we are not going to engage in human interplanetary travel, then the primary rationale for the space station program—learning about the effects of long-duration spaceflight on

human physiology—must be brought into question as well.

The point is not that we should be blasé about risk. The point is that there are certain things that require accepting risk to achieve, and are worth the price that such a course will entail. The search for truth, carried forward by necessarily perilous human activities in space—whether at Hubble, or on Mars—is one of them. Nothing great has ever been accomplished without courage. If we abandon courage, we turn our back on all that has made our civilization one worth celebrating.

In recommending the abandonment of Hubble, NASA is allowing the destruction of a \$4-billion piece of property paid for and owned by the American taxpayers. Four billion dollars is about the cost of a nuclear aircraft carrier. By NASA's reasoning, a commander could allow his vessel to sink, based on the following rationale: "The ship developed a leak. I could have saved her by ordering seven men to go below and patch her up, but the odds in their favor were only 50 to 1. So I decided the safest course was simply to give up the ship.

No navy could achieve anything if it chose to accept such thinking. Nor can NASA. If humans are to explore space, we must be willing to accept risk. 📌

Dr. Robert Zubrin is president of the Mars Society and author of *The Case for Mars*, *Entering Space* and *Mars on Earth*.

NASA lays out rational for axing Hubble housecall

The following is the executive summary of a position paper NASA issued to explain its decision to cancel the next servicing call to the Hubble Space Telescope.

The Hubble Space Telescope (HST) was originally launched aboard the Space Shuttle in 1990, with an as designed mission lifetime of 15 years. Since then the telescope has been serviced or upgraded four times, each requiring a very complex, dedicated Space Shuttle mission and unique HST servicing support equipment. Even before its repair mission in 1993, the HST had generated significant scientific discoveries. The science return from HST has already vastly exceeded the original expectations.

NASA plans continued operation of the HST until it can no longer support scientific investigations anticipated to occur in the 2007-2008 time frame. The telescope's life may, in fact, be extended if NASA is successful in employing operational techniques to preserve battery and gyroscope functions. Meanwhile, NASA is aggressively investigating innovative ways to extend the science lifetime of the HST for as long as possible, including robotic servicing to provide extension of power storage. Current plans are to safely deorbit the HST by a robotic spacecraft by approximately 2013.

Although the HST deployment mission and four subsequent servicing missions were successfully conducted, the Columbia tragedy underscored the inherent risk in each and every Space Shuttle mission and reinforced the need for increased ability to deal with all potential contingencies, particularly catastrophic damage to the Orbiter's thermal protection system (TPS).

Without the benefit of docking at the ISS many new tools, processes, and techniques would be required for inspection and possible repair of the TPS. More significant would be the requirement to dedicate two Space Shuttles to the mission to ensure astronaut safety. In the event of a significant problem with no safe haven for the astronauts to wait as in ISS missions, a second Shuttle would have to be launched and employ untried and uncertified techniques to perform a rescue. Hence, a Shuttle based HST servicing mission presents known additional risks, and offers few options to respond to serious problems in orbit.

Recognizing the increased risks involved in all Shuttle flights following the tragic loss of the Columbia and crew NASA elected to reduce its planned Shuttle manifest to only missions to the International Space Station (ISS). The decision was also made, on the basis of risk, to not pursue a final servicing mission to the HST, but instead to investigate other options to extend the life of the Hubble. Read the full report at <http://www.nasa.gov/audience/formedia/features/index.html> 📌

Partisan Politics Shattering Space Dream

BY FRANK SIETZEN, JR.

Former President Harry Truman was fond of joking that if you wanted a friend while in Washington get a dog—particularly if you were looking for a friend on the other side of the political fence.

In a Capitol bifurcated by political differences on virtually everything including the weather, the issue of space exploration has been a bone of contention—a situation that may have implications well beyond the outcome of the 2004 presidential election. President George W. Bush's space initiative may well be the most comprehensive space plan to emerge from the federal bureaucracy in a generation. But its failure, if that is what occurs due in part to partisanship, will close a door to space activities, perhaps for decades.

Following Bush's announcement in January redirecting NASA's human spaceflight program back to the moon and eventually on to Mars, public and political reaction has been mixed. Recent polls indicate more than 60 percent of the public oppose the plan, primarily due to a belief that the program's cost will reduce the federal treasury by as much as a half-trillion dollars. While this is a figure that has never been expressed officially or unofficially by anyone in the administration, it has taken on a life of its own.

Using the high costs of the exploration initiative, Congress quickly divided over support for the program shortly after its introduction. Skeptics did not line up along party lines, with concerns raised by Republicans as well as Democrats. But it has been Democrats who are most vocal in their opposition.

Sen. John Kerry, a Massachusetts Democrat and the party's top contender to unseat Bush in the Nov. 4 election, initially blasted the idea, but later softened his position. "Sending a person to Mars is a great mission worthy of a great nation like America," Kerry told the Associated Press in March. "Given the Bush budget deficit," he added, "it is imperative that we balance funding for a manned mission to Mars against critical domestic needs."

Other Democratic supporters and leaders—some of whom in a different political climate likely would have backed the idea to send astronauts beyond Earth orbit—have been cool to the plan. Former Mars Pathfinder mission manager Donna Shirley, who has been identified as closer to Democrats than Republicans, has expressed doubts about the proposal. Former Ohio senator and astronaut John Glenn has not only come out against the plan, but got into a shouting match with NASA administrator Sean O'Keefe about it, saying that shifting the space station's research program to focus exclusively on human factors issues was "a betrayal" to scientists who had spent

years planning other types of microgravity space science experiments. Glenn subsequently endorsed Kerry for president.

Another Kerry-backer, Sen. Bill Nelson, a Florida Democrat who flew on the space shuttle during a previous Congressional term, initially supported Bush's plan, but has since retreated from the project, citing uncertainty over the cost.

In fact, no Democrat has moved to publicly embrace the idea. Senior Democratic staffers say this is no surprise. "Bush has politicized space as he has politicized every other area of science policy," said one staffer. "So it should not be a shock that no one on our side has come out for it. Why should we, when there are so many Republicans with questions of their own?"

Adding to the doubts about the moon-Mars effort has been the fiasco over plans to retire the Hubble Space Telescope. Announced two days after the Bush space speech, many in Congress have connected the decision to cancel Hubble servicing missions with paying for the moon-Mars plan. While O'Keefe repeatedly denies the connection, doubts persist. Sen. Barbara Mikulski, a Maryland Democrat, requested a National Academy of Sciences review of the Hubble decision. Mikulski, usually supportive of NASA programs, also has expressed concerns about the costs of the moon and Mars exploration plan.


In the House, Science Committee members and Democrats Bart Gordon of Tennessee and Mark Udall of Colorado have expressed reservations and refused to fully fund the plan's startup costs. Only Rep. Nick Lampson, a Texas Democrat, has strongly endorsed the effort, though he criticized the Bush administration for not giving it enough initial funding.

Democratic staffers blame the situation on Bush's tactics. Majority Leader Tom DeLay, a Texas Republican, has told members they should expect to pass the NASA bill with the Bush plan intact with only Republican votes. Complicating the issue is a perceived politicization of the White House's other science policies, from global warming to stem cell research, which has made building a coalition among pro-science Congressional members hard if not impossible in today's charged partisan atmosphere. "You can't expect to separate space from these other issues now," said one Democratic staffer.

So what will happen?

If Kerry is elected president, NASA could find itself at a crossroad: It will be heading toward retirement of the shuttle, but with no replacement vehicle in sight. If Kerry cancels the Moon-Mars plan, expect a strong commitment to continued robotic exploration of the planets. But human spaceflight will face an uncertain future.

If Bush is re-elected but the space plan fails to get started in this session, it is not clear how well it will fare among the competing priorities of a second term in office. "Truth is, if you want this to succeed, then we have to find a way to get it through this year," said a Republican staffer.

Otherwise, the long awaited effort to send astronauts beyond Earth orbit might never leave the ground. 

Frank Sietzen is a Washington, D.C.-based freelance writer and the former editor of *Ad Astra*.

Scientists ready to hop aboard manned moon initiative

By LARRY O'HANLON

Long before George W. Bush's January announcement of a new push to the moon, there was a new moon race under way—and NASA was about the only player not taking part.

Europe, Japan, the private sector and, more recently, China all have set their sights on the moon. Some are going for science, some for other reasons. But science will be in the plans somewhere, and there are a lot of researchers who know exactly where to take up the threads that were dropped at the end of the Apollo era and picked up only intermittently since then with robotic missions.

"There's no question that there is a lot of science left to do on the moon," said Robert Strom, professor emeritus at the University of Arizona's Lunar and Planetary Lab. Strom was involved in the Apollo program, as well as the earlier unmanned Ranger, Surveyor and the Lunar Orbiter missions.

Among the unfinished lunar business is finding out how the moon's interior is arranged. "We know it

has an iron core," says Strom, "and that there are moonquakes. Those moonquakes send vibrations through the moon that could reveal a lot about the structure, if only there were some seismometers up there."

The Japanese already are working on a small lunar seismic network. The Lunar-A spacecraft is equipped with two, yard-long penetrators that will be shot into the moon's surface from lunar orbit. Each

penetrator contains a seismometer, heat-flow measurement instrument and antenna for sending data back to Earth. The probe is scheduled to launch later this year.

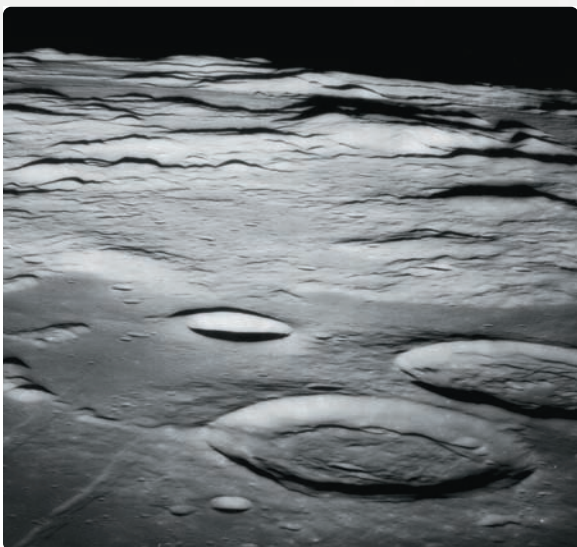
Another big scientific question that additional lunar exploration could easily answer is the history of bombardment. Many planetary scientists now suspect that the heavily cratered landscape of the moon—and similar terrain on Mars and Mercury—was created during a relatively short period of time between 3.8 and 3.9 billion years ago when the moon and all the other planetary bodies in the inner solar system were subjected to a brief but intense bombardment, says Strom.

The easiest way to confirm this would be to gather more moon rocks from more craters and return them to laboratories on Earth for radioisotope dating. Not only could this data confirm the catastrophic event hypothesis. It also might help scientists understand what the actual large impact rate has been during the history of the moon—and of early Earth—so that estimates of impact hazards based on Near Earth Object observations can be bolstered with more actual impact data, says Strom.

WATER, WATER, ANYWHERE?

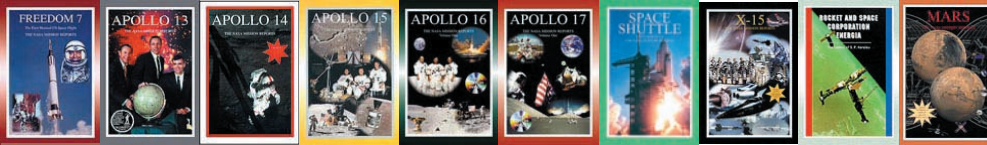
Perhaps the most pragmatic unfinished lunar science is what occupied the last U.S. lunar mission, Lunar Prospector, before it crash-landed on the moon's southern polar region in September 1999: prospecting for water. "If you're looking at (having a) manned presence on the moon, water is essential," says Dennis Laurie, president of San Diego, Calif.-based TransOrbital Inc., a private firm slated to launch the first commercial lunar probe, Trailblazer, in November.

Both Lunar Prospector and the Defense Department's 1996 Clementine spacecraft gathered evidence that there might be water hiding in the perpetually shadowed craters of the lunar poles. Moon rocks brought back by Apollo astronauts are remarkably "anhydrous" or waterless, says Strom.

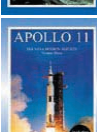
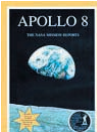
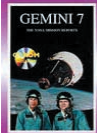


NASA

Unlike Earth, the moon's surface has remained relatively unchanged over the eons. The lunar rocks hold the history of the moon's past, a history that — like Earth's — includes cataclysmic impacts.



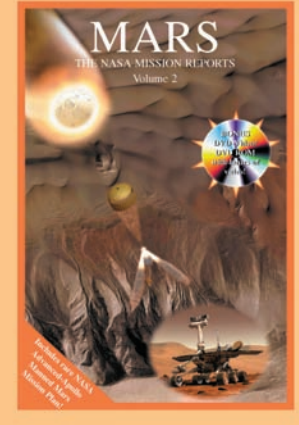
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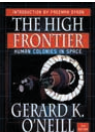
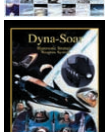
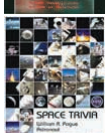
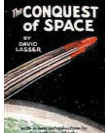
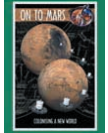


MARS The NASA Mission Reports Volume 2

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"Although substantially pricier than unmanned probes, human missions have a lot of advantages when it comes to doing science. Take the Mars rovers, for instance, the geological work that has taken weeks for the rovers to do would probably have been accomplished more effectively in a couple of hours by a competent human geologist."



This approximate true-color image, acquired by the Mars Exploration Rover Opportunity's panoramic camera on April 9, 2004, features the hole ground by the rover's rock abrasion tool into "Bounce" rock. Like Mars, the moon's surface is littered with impact craters.

NASA/JPL/CORNELL



JAXA

Japan's Lunar-A, set for launch this year, will monitor the interior of the moon for vibrations and quakes using a pair of seismometers that will be planted into the ground.

If, as most planetary scientists now believe, an impactor tore free a chunk of early Earth to create the moon, then the molten state of that chunk might have caused all its water to be lost to space. The water signals seen by Lunar Prospector and Clementine could be nothing more than the sparse remnants of water deposited later on the moon by comets and water-bearing meteoroids that have slammed into the lunar surface, says Strom.

What makes water so pragmatically important, of course, is that astronauts need it to drink and that it can be broken into its component elements—hydrogen and oxygen—to produce hydrogen fuel and breathable oxygen. Rather than paying for expensive transport, supplies of water for human space exploration may be available on the moon.

Yet another very practical question remaining from the Apollo era is whether more unmanned probes to the moon are really the best approach to lunar science, says Strom. Beginning with the 1959 Pioneer 4 flyby, there have been 47 manned and unmanned spacecraft that have either targeted or included the moon in their missions. The 48th probe is on its way right now—the European Space Agency's SMART-1 spacecraft, which is primarily a test craft for a variety of new space-faring technologies.

The Bush space initiative calls for more unmanned probes to the moon by 2008 and a manned mission by 2015—almost 40 years after the last astronaut set foot there. But it's unclear

whether unmanned probes, though less expensive, are the most effective way to get science done.

Although substantially pricier than unmanned probes, human missions have a lot of advantages when it comes to doing science, Strom says. Take the Mars rovers, for instance, he says. The geological work that has taken weeks for the rovers to do would probably have been accomplished more effectively in a couple of hours by a competent human geologist.

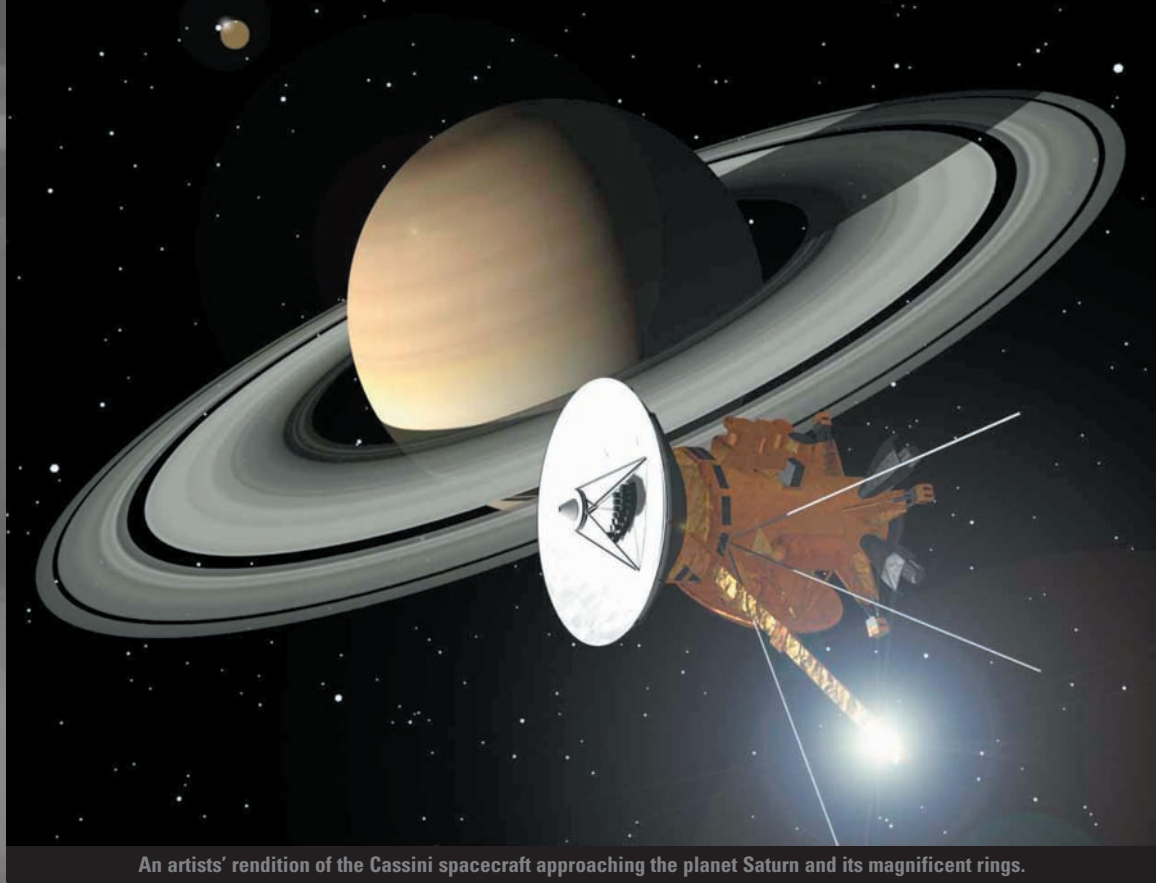
"There are certain efficiencies with humans," said Mars Exploration Rover scientist and Cornell University geologist Robert Sullivan. "It took us about 12 or more days to roll off the lander to get images of the soil and rocks. It would have taken you or me about 30 seconds."

A human geologist also is more likely to make correct field analysis of a rock, says Strom. For example, pre-Apollo Surveyor moon landers beamed back pictures of sparkling rocks from the lunar surface that geologists on Earth were certain were facets of crystals in an igneous rock. It wasn't until years later that Apollo astronauts picked up the same rocks and promptly reported that they were, in fact, masses of smaller rocks cemented together in what is called a breccia rock.

The bottom line, says Strom: "You can get a million rovers up there and not get the answers. There is just no substitute for being there." 📌

Larry O'Hanlon is a New Mexico-based geologist and freelance science writer.

After a journey that's lasted nearly seven years, the Cassini spacecraft is almost ready to delve into the mysteries of the Ringed Planet



An artists' rendition of the Cassini spacecraft approaching the planet Saturn and its magnificent rings.

NASA

Sailing at Saturn

BY KURT M. HAYES AND STAFF REPORTS

On July 1, the long-awaited arrival of the Cassini spacecraft and Huygens probe will take place around the ringed planet Saturn. It seems a long time ago that the Cassini satellite was launched from Cape Canaveral, Fla. A launch many thought might never occur did take place on Oct. 15, 1997, with media attention focused more on controversy over the spacecraft's radioactive power pellets than its majestic scientific quest.

Giovanni Domenic Cassini would have been amazed at the prospect of a spacecraft setting off on a journey to Saturn, the planet that served as the focal point of his career. With its extraordinary community of 31 moons and its magnificent rings, Saturn was of particular fascination to Cassini, a 17th-century, French-Italian astronomer. Indeed, Saturn, named after the Roman god of agriculture, is a favorite of most school children, with its beautiful rings floating like a halo around an orb that ranks second to Jupiter as the largest planet in the solar system.

Over the course of his studies, Cassini discovered the separation between the two largest rings of Saturn, subsequently termed A Ring and B Ring. The gap between these two rings has since been known as the Cassini Gap. Cassini also discovered Saturn's moons Dione, Iapetus, Rhea and Tethys.

Born in Italy on June 8, 1625, Cassini was a curious youth fascinated by the world around him. He would develop into an

exceptional mathematician and astronomer, who continued in his study of the Saturn system until becoming blind in 1710. Cassini died two years later.

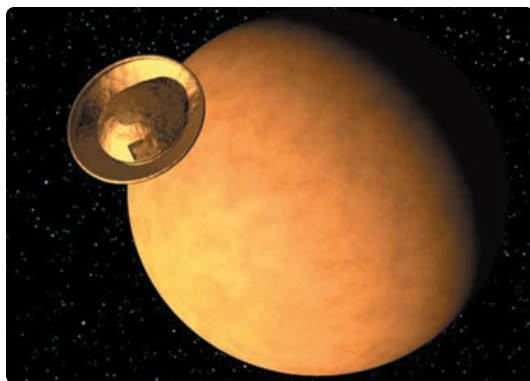
The spacecraft that bears his name will perform numerous studies of Saturn during a \$3.4-billion mission slated to last four years. The spacecraft already has proved its worth. During a pass by Jupiter in December 2000, Cassini joined the Galileo spacecraft for a collaborative series of studies — the first time scientists ever had the opportunity to examine Jupiter from two close-up perspectives simultaneously.

In all, the Cassini spacecraft is equipped for 27 diverse science investigations using its 12 scientific instruments, including a plasma wave instrument, magnetospheric imaging instrument, composite infrared spectrometer and a cosmic dust analyzer. Cassini also carries a piggyback probe, Huygens, that has its own set of six scientific instruments for an independent study of the Saturn moon Titan.

PLAN B

The probe, built by the European Space Agency, had been slated for release in November 2004, on a course toward the surface of Titan. Three weeks later, Huygens would enter the moon's atmosphere, open a parachute and make a 2 1/2-hour descent to the moon's surface.

This artist's rendition depicts the Huygens Probe, after deploying from the Cassini Orbiter, en route into the murky atmosphere of Saturn's largest moon, Titan.



MASA/JPL/SPACE SCIENCE INSTITUTE

During the descent, Huygens is to transmit large amounts of data at high speeds to Cassini, which, in turn, will radio the information to Earth. Because Huygens and Cassini will be moving away from each other during the study, the frequency at which Huygens' transmissions are received will shift, a phenomena known as the Doppler effect. It is the same reason why the pitch of a train whistle shifts as the train approaches.

In the fall of 2000, ESA realized that Cassini's receiver had not been designed to cover the full range of frequencies generated by the Doppler shift. Left unattended, the oversight would have left large gaps in the spacecraft's ability to receive Huygens' data.

After months of study and testing, managers decided to resolve the problem by delaying Huygens' release so that Cassini is moving slower and at a much greater distance from Titan during the probe's descent. Instead of deploying the probe during its first pass around the moon, Cassini will keep Huygens in its clutch until the third flyby of Titan in January 2005. The geometry of the new orbit significantly reduces the amount of Doppler shift and puts data transmission frequencies within the range of Cassini's receiver.


Cassini project manager Robert Mitchell is confident the problem has been corrected. "The Cassini systems were tested using the Deep Space Network communications here on Earth. We sent data to Cassini. It was received, stored and

WHAT WE KNOW ABOUT SATURN



MASA

The Voyager probes, which passed by Saturn in 1980 and 1981, have provided the only direct measurements and observations of the planet. Among their findings:

- Saturn's atmosphere is almost entirely hydrogen and helium. Voyager 1 found that about 7 percent of the volume of Saturn's upper atmosphere is helium (compared with 11 percent of Jupiter's atmosphere), while almost all the rest is hydrogen. Since Saturn's internal helium abundance was expected to be the same as Jupiter's and the sun's, the lower abundance of helium in the upper atmosphere may imply that the heavier helium may be slowly sinking through Saturn's hydrogen. That theory might explain why Saturn radiates more heat than it receives from the sun.
- Subdued contrasts and color differences on Saturn could be a result of more horizontal mixing or less production of localized colors than in Jupiter's atmosphere. While Voyager 1 saw few markings, Voyager 2's more sensitive cameras saw many: Long-lived ovals, tilted features in east-west shear zones, and others similar to, but generally smaller than, on Jupiter.
- Winds blow at high speeds in Saturn. Near the equator, the Voyagers measured winds about 1,100 mph. The wind blows mostly in an easterly direction. Strongest winds are found near the equator, and velocity falls off uniformly at higher latitudes. At latitudes greater than 35 degrees, winds alternate east and west as latitude increases. Marked dominance of eastward jet streams indicates that winds are not confined to the cloud layer, but must extend inward at least 1,200 miles. Furthermore, measurements by Voyager 2 showing a striking north-south symmetry that leads some scientists to suggest the winds may extend from north to south through the interior of the planet.
- While Voyager 2 was behind Saturn, its radio beam penetrated the upper atmosphere, and measured temperature and density. Minimum temperatures of -312 degrees Fahrenheit were found at the 70-millibar level (surface pressure on Earth is 1,000 millibars). The temperature increased to -202 degrees Fahrenheit at the deepest levels probed – about 1,200 millibars. Near the north pole temperatures were about 18 degrees Fahrenheit and colder at 100 millibars than at mid-latitudes. The difference may be seasonal.
- Aurora-like ultraviolet emissions of hydrogen exist at mid-latitudes in the atmosphere, and auroras at polar latitudes (above 65 degrees). The high-level auroral activity may lead to formation of complex hydrocarbon molecules that are carried toward the equator. The mid-latitude auroras, which occur only in sunlit regions, remain a puzzle, since bombardment by electrons and ions, known to cause auroras on Earth, occurs primarily at high latitudes.
- Saturn completes one rotation in 10 hours, 39 minutes, 24 seconds. **Source: NASA** 



returned back to Earth without any problems ... We feel that this problem has been resolved.”

EXPERIENCE HELPS

NASA has learned a lot about deep space missions since the early days of the Pioneer and Voyager missions.

“Every time we build another spacecraft we learn,” said Mitchell, who has worked on the Mars Mariner and Viking missions. “Keeping a spacecraft functioning well over great periods time is challenging.”

Coming on the heels of the successful Mars Exploration Rover missions, Cassini is expected to be another showcase adventure for NASA. For many, the highlight of the mission will be the Titan-probe Huygens, named for the Dutch astronomer Christian Huygens (1629–1695), who pioneered the development of improved lenses for telescopes. It was because of this technical achievement that Huygens discovered Saturn’s moon Titan – the second-largest moon in our solar system and the only other moon besides Neptune’s Triton to have its own atmosphere. The nitrogen-and-carbon bubble that envelops Titan is believed to resemble the atmosphere that once wrapped baby Earth.

“Titan is like Earth billions of years ago,” said Mitchell. “The major difference is Titan is much farther away from the sun and is in more of a

deep freeze. We may find the building blocks of life on Titan.”

Of all the instruments carried by the Huygens probe the most exciting is the camera. The Huygens camera will relay more than 1,100 pictures of the Titan surface after breaking through the moon’s dense cloud cover. One can only imagine the beautiful vision of the Titan lakes or oceans of liquid methane or ethane. The excitement generated by the Spirit and Opportunity Mars rovers would pale in comparison to a view of actual methane lakes or oceans of ethane on the surface of Titan.

AN ANCIENT EARTH?

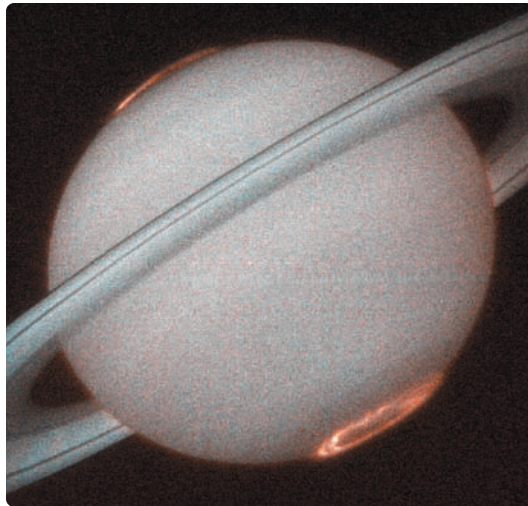
Cassini scientist Jonathan Lunine, with the University of Arizona, once described Titan as follows:

“Imagine a world that’s smaller than Mars and bigger than the planet Mercury where the air is four times denser at its surface than the air in this room and the surface pressure is about the same as you’d experience at the bottom of a neighborhood swimming pool. On that world, the distant sun is never seen and at high noon, things are no brighter than a partly moonlit night on the Earth.

“Because of its great distance, the cold is so enormous that water is always frozen out of the atmosphere. Nitrogen is nearly so, but not quite. And the simplest organic molecule, methane, is

As Cassini closes in on Saturn, its view is growing sharper with time and now reveals new atmospheric features in the planet’s southern hemisphere.

Saturn in ultraviolet light, as seen by the Hubble Space Telescope. Auroral curtains of light are seen rising 1,000 miles above the cloud tops of Saturn's north and south poles.



NASA

there to take the place of water as a cloud-former, possibly a rain-maker and maybe even the stuff of lakes or seas of hydrocarbons.

“The methane is lofted hundreds of miles above the surface of this world. It is cracked open by sunlight and cosmic rays and a menagerie of more complicated organics is produced from the methane and these then float down to the surface to accumulate over time, perhaps to depths of hundreds of meters or more. Volcanism and impacts shape the surface and provide energy to make ever more complex organic molecules in a planet-wide tapestry that is an organic chemist’s dream.”

Scientists got a tantalizing glimpse of Titan from Voyager 1, which flew by Saturn in November 1980. The probe discovered Titan’s dense atmosphere, but its cameras could not penetrate Titan’s organic haze.

“We do not know what awaits Cassini/Huygens at the end of its journey,” said Lunine.

Should Huygens land in a frigid lake of ethane (at -290 degree Fahrenheit) it is unlikely it will be able to transmit any further data to the Cassini satellite. But if the probe withstands the 15 mph impact onto the Titan surface and does not wind up in a lake, it should continue to transmit pictures and data for up to 30 minutes.

Throughout the descent, Huygens’ other instruments will be busy sampling the atmosphere, studying Titan’s winds, and assessing the atmospheric composition. From its orbital perch, Cassini will be turning its instruments toward Titan as well for dozens of studies that include using its 13-foot-wide dish to make radar maps of the moon’s surface.

Of the spacecraft’s planned 74 orbits around Saturn, 44 will include passes by Titan.

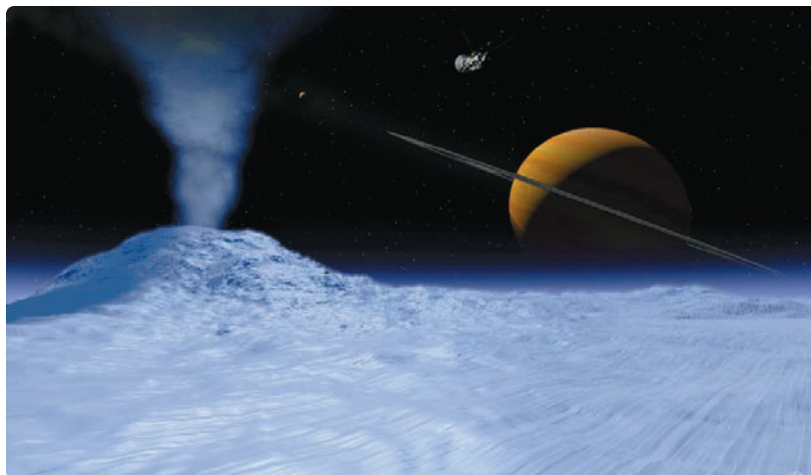
Scientists don’t know what to expect, but they are hoping the mission will provide some additional clues about how life began on Earth.

“Titan is almost certainly not the home of life today,” said Lunine. “But the organic chemical cycles that go on may constitute a chemical laboratory for replaying some of the steps that led to life on Earth. Titan is in some ways the closest analogue we have to the Earth’s environment before life began and this makes Titan very important.”

With its rings and moons, the Saturn system itself has been compared to a miniature solar system. Scientists in particular are curious about the processes that sustain the ring system, which is some ways resembles the early solar nebula out of which all the planets formed.

“With Galileo we learned things we could not have predicted, such as the oceans beneath Europa. Saturn is even less understood than Jupiter,” said Mitchell. “We will learn from our surprises.”

ARTIST: DAVID SEAL



Artist rendering shows the bright, icy surface of icy Enceladus. In the foreground, an ice geyser can be seen projecting a jet of vapor into space. Enceladus is considered by some as the source of Saturn’s E ring (which can be very faintly seen along Saturn’s equatorial plane); icy geysers may be responsible for sustaining the E ring’s supply of micrometer-sized particles.

The new vision could end up being
a first step in the long-term development
of space, and hence the best
tribute imaginable to Columbia.

BY JOAN JOHNSON-FREESE



REMEMBERING COLUMBIA?

President George W. Bush has announced a new vision for the United States to return to the moon, Mars, and beyond. Apparently the as-yet-still-unnamed initiative—and any initiative worth its salt has a catchy name and an acronym—is initially to be funded with \$1 billion in new money and \$11 billion NASA is to scavenge from other programs. Under almost 10 years of leadership by former NASA Administrator Dan Goldin, NASA turned itself inside out trying to find ways to operate “faster, better, cheaper” (and usually found itself able to do two out of the three, but not all.) NASA cut the fat. Therefore, there is no “extra” \$11 billion—so programs will be cut. That’s where Columbia comes in.

One of the lesser-remembered aspects of the STS-107 mission is its research agenda. It carried 80-plus experiments representing the latest applications of microgravity as a fundamental tool to gain insights in space and improve life on Earth. The international team of microgravity scientists involved in those experiments rejoiced that their long overdue time had finally come. The research was to have been a huge step toward longer, even more ambitious programs on the International Space Station. That’s over now.

Apparently in discussions leading up to the new vision’s announcement, current NASA Administrator Sean O’Keefe convened his associate administrators and told them that to make way for the new vision, NASA would need to stop certain research programs, including most microgravity and material science research. O’Keefe asked if anybody had a problem with that, and silence provided his answer.

With the announcement of the new space vision for the United States, anything not directly related to manned spaceflight immediately became expendable, and not just in the United States. The day after the president’s speech, European microgravity programs were cut and other programs put on hold.

Space science is always an easy target. Draconian cuts suffered by NASA space science programs in 1981 were geared

toward getting the over-budget shuttle launched. Environmental and climate studies will be easy targets too.

The new initiative is supposed to boost the morale at NASA. While some NASA offices are likely pleased, resumes likely are being updated in others. Perhaps that’s unavoidable with a new vision. NASA has been drifting without a clear goal since Apollo. The menu of programs it subsequently developed met with mixed success at best. The retirement of the space shuttle, originally intended as an experimental not an operational vehicle, is long overdue. Considered sacred by many at NASA, any new vision taking that giant step bears merit. Providing NASA with focus is clearly a prerequisite for organizational rebirth; success thereby justifying draconian cuts in other programs. But for such a high price in areas primarily of scientific research, substantial results are warranted, and history is rife with space visions gone awry.

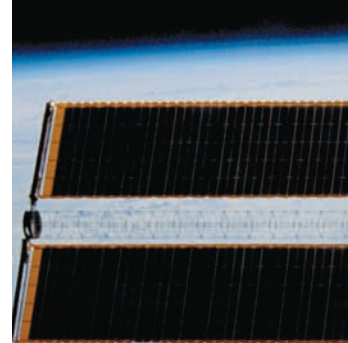
The new vision has the benefit of price tag omission, which would have been guaranteed to induce Congressional sticker shock, and hence deem it dead on arrival at the Capitol. But the new vision is still largely one without details, and the devil is always in the details. It could end up being a first step in the long-term development of space, and hence the best tribute imaginable to Columbia, or it could end up being known as the vision that created a cottage industry of paper studies and produced a plethora of viewgraphs, while shutting down entire areas of research. If the latter, it will join past initiatives, like the Space Exploration Initiative announced by George H. Bush that have died from fiscal anemia, lack of public support, and no linkage to strategic purpose. Columbia deserves a fitting memorial, and the administration must now address the hard questions and details requisite for a successful outcome, technical, political or both.

What, for example, will inspire the Pentagon and private companies to collaborate long-term on this program when such cooperation has not been the norm in the past? The history of developing a reusable launch vehicle illustrates the difficulties.



Takao Doi, an astronaut with the National Space Development Agency of Japan, monitors a test of Japan's space station laboratory module, Kibo. The module is among the backlog of components waiting to be flown to the outpost.

The unfinished International Space Station photographed in November 2002 by the last shuttle crew to visit the outpost before the Columbia accident.



The focus of Europe's human space program is changing as a result of the shift in U.S. policy on the space station. The European astronaut corps from left, top row: Paolo Nespoli, Thomas Reiter, Christer Fuglesang, Frank de Winne, Michel Tognini, Hans Schlegel, Philippe Perrin, André Kuipers; bottom row: Pedro Duque, Gerhard Thiele, Jean-Francois Clervoy, Umberto Guidoni, Leopold Eyharts, Reinhold Ewald, Roberto Vittori, Claude Nicollier.

ESA



Private sector enthusiasm begins to fade when government seed money is exhausted. Understandably, companies are reluctant to support programs reliant on future administrations with their own agendas and visions for additional funding. Simply from a business perspective, spending company funds developing technology with no guaranteed buyer makes little sense.

The Pentagon will be interested. Whatever NASA develops will be icing on the cake for an already-dominant U.S. military space program. It is unlikely, however, that interest will translate into significant dollars. In order to win military support for the shuttle program, necessary for political approval from the Nixon White House, NASA redesigned the orbiter according to Pentagon specifications. But the only money the military kicked in was for building a launch pad at Vandenberg AFB in California, a pad that ultimately the shuttle never used. So is military interest a good thing or a bad thing?

These are details that must be addressed, and present no easy answers. These are the details that make skeptics nervous. Risks can't be avoided, but they must be confronted.

It is in the international political arena that the potential for the greatest tribute and success lies, and questions still remain there as well. Partnering with the United States has proven tricky at best on ISS, and countries have sometimes found they can only afford so much U.S. friendship. But as the big elephant, other space programs simply get dragged, to some extent, in the direction the United States is going, witness the European microgravity programs. We can do better than that.

Apparently it was President Bush himself who stated during the development of the vision that he wanted international partners involved. That sentiment was reflected in his public announcement of the vision as well. But there has been no clarification of which countries, or how they would be involved. Not including other countries during the early discussions, however, raises the same issue that initially plagued the International Space Station: Does the U.S. want international partners, albeit junior partners, or did we want international participants? The former implies inclusion in decision-making, whereas the latter does not. ISS partners sometimes felt themselves more subcontractors than partners. Is that the model intended again?



NASA

If the United States employs the new vision as an opportunity to reach out to other countries as partners on an inclusionary rather than an exclusionary basis, the program will ultimately become as much about strategic leadership as technology that may or may not be built in the near future. That purpose alone enhances long-term political support. Vision details still are nebulous enough to allow participation in defining milestones, thereby creating partners, not subcontractors. Cooperative and multinationalists can replace competitive and nationalism as the preponderant perceptions of the United States abroad, at least concerning humanity's final frontier. But bringing potential partners in on serious discussions must be done soon.

Already, the U.S. has left its ISS partners to scramble. Japan's participation in the space station, for example, was premised on both a *tatema*, referring to the official reason for doing something, and a *honne*, the real reason. Their *honne* was to show that Japan could be a good partner on a large, long-term technical program. Their *tatema*, however, important in the Japanese domestic political arena, was microgravity research.

In terms of who to include, China's October 2003 launch of their first taikonaut demonstrated its technical maturity. Bringing the Chinese into the international space community would allow the U.S. the opportunity to shape future Chinese space activities, rather than China potentially working in areas not to its liking or on space programs not involving the U.S.—like the European Galileo navigation satellites—and thus the U.S. ending up with 100 percent control of nothing. Brazil, India, South Korea and other countries may well want to join in as well, and U.S. experience with cooperative space activities shows the benefits of potentially including them, toward building a coalition of the willing in space.

There is a window of opportunity for the US to define the details of the new space vision in ways that show both serious commitment and the desire to lead because it wants to, not because it can. That truly would be a tribute to Columbia. 🍀

Dr. Joan Johnson-Freese, a noted space policy expert, chairs the National Security Decision Making Department at the Naval War College in Rhode Island.

Your Views

NSS members have rallied to support the space exploration directive outlined by President Bush in January. Here are excerpts of some of your letters and commentaries.

To: Suffolk Life
From: Arthur Smith, President,
Long Island Space Society
Subject: Space – What Does it
Do For You?

Dear Editor,

Brent Marcovecchio and Christine Suarez (Point of View "Let's Deal With Problems on Earth" and letter, Feb 18, 2004) have a point: a lot of the money that goes to NASA is not spent wisely. NASA has for years been treated primarily as a jobs program for engineers and aerospace contractors in selected congressional districts. Yes, there are spectacular images to show for it all, but what does it do for you?

Space has enormous untapped potential to benefit average people, much as the Americas did 500 years ago. Do we need new renewable energy sources? Solar energy trillions of times what we use now streams past us through empty space every day. Learning to live in small, enclosed environments, such as the proposed base on the Moon, could have enormous impact on recycling and resource conservation here on Earth. New innovative companies developing reliable reusable spacecraft promise a new era of space tourism as accessible as travel on any cruise ship.

It's the 21st century in a big universe; we need to spend just a little of our effort on better figuring out our place in it.

To: *Memphis Commercial Appeal*
From: Richard McNeil, member National
Space Society
Subject: Editorials

Dear Editor,

Your running the face-to-face editorials on Friday was an interesting case for the diversity of American thought.

Unfortunately, Bill Day's editorial is wrong in several ways, but John Paschal's "Voyage to Mars is a trip we must take" is a refreshing counter balance.

To take the main issue with John Day's editorial, a funding plan that would cost only \$20 billion to get to Mars was proposed by Robert Zubrin in The Case for Mars. While this was proposed about 1997, and some upward adjustment may be called for, I would suspect that his figures would still work. This is what I call the 'PAY FOR PERFORMANCE' plan. That is, the government will pay \$20 billion to the first group that gets to Mars.

One charm of this plan is that nothing is spent unless someone gets to the Red Planet, or meets one of the milestones on the path. Another charm is that any group pursuing the goal can get there on their timetable — whether it takes 30 years, or three. This works, as the flights of SpaceShipOne by Burt Rutan's group over Mojave, Calif., is demonstrating. It's about time the ancient art of rocketry borrowed one of the great ideas from the start of aviation.

So let's go to Mars—not only for the thrill of the exploration, the national pride, but to show that private interests can make money at it!

To: *Today Show, Australia*
From: Tim McEgan, President National Space
Society of Australia
Subject: Cost of Space Exploration

Dear Today Show,

It is regrettable that the common perception

about President Bush's initiative is that it will cost too much, when in fact the opposite is true.

The main concern is, however, not the expense of the initiative, but the lack of logical context around this debate. It is very easy for Australians to hear the cost of \$15 Billion and think that is a huge expenditure. Very seldom do we hear the press report that this amount is less than 1% of the total U.S. annual budget. In fact, Americans spent double that (over \$30 Billion) on pet care last year. While pet care is not government expenditure, the context is still that American pets are more important than humans moving outward to improve our lives.

It is in our nature as humans that we easily forget the "positives" and focus on the "negatives." It is therefore very easy for us to forget that space exploration has brought about thousands of commercial products and applications that have improved our lives.

It is time to put the cost of President Bush's space exploration initiative back into context and realise (sic) that at some point we must go. His plan is equal to approximately US\$55.00 per person in the USA per year. It will be much cheaper to go now than in another hundred year's time!

To: *Salt Lake City Deseret Morning News*
From: John David Baxter, Director, National
Space Society
Subject: Costs and Benefits of Space

Dear Editor,

I saw the political cartoon, in Friday's paper, depicting the Bush Space Program as costing "to infinity and beyond!" In reality, the Bush Space Program, at maximum cost, won't be above 1% of the federal budget. Also, \$25 Billion per year, estimated for later development of the Space Program, will return to the economy \$200 Billion per year in benefits. This estimate is based on studies from the benefits from project Apollo, given by the General Accounting Office. No other federal program gives these results.

ROCKETS FOR SCHOOLS

By G.B. LEATHERWOOD

Anyone who has ever even thought about rockets and schools has to know that it's not something you just start up and do by yourself. The NSS Sheboygan Space Society knows a lot about what it really takes.

Each year, the Great Lakes Space Port Education Foundation Inc., sponsors their annual "Rockets for Schools" program, a two-day event involving school children from Wisconsin, Illinois, Indiana, Iowa and Michigan. This year Minnesota is sending teams.

The students launch rockets they have built with the help of their science teachers, make oral presentations to judges, set up and maintain

displays, and take part in all aspects of the rocket business — mission control, tracking and recovery, weather balloon launches and hearing experts tell about their experiences.

In 2003, 280 students and many adults were treated to a flyover by a U.S. Air Force B-1 Lancer bomber on Friday, a B-2 "Stealth" bomber on Saturday, and a visit by astronaut Michael Foreman. Even the cloudy and cold weather couldn't dampen the excitement during the two-day adventure. Participants are hoping for clearer skies during this year's event, scheduled for May 14 and 15.

And where does the National Space Society come in? Will Foerster, president of the Sheboygan Space Society, said, "Our project is mostly volunteer work to help set up and staff a booth with the Sheboygan Astronomical Society. We usually have a good-sized display. But the ones who really do the work are Randy and Carol Lutz. They are the ones who arrange for various groups such as the National Guard, Coast Guard, Civil Air Patrol, Boy Scouts, and other groups, to help with everything from recovery operations to air surveillance to making sure no aircraft stray into the no-fly zone and helping people find a parking space."

During last year's event, the group arranged for a Moon Suit exhibit from NASA as well as a Moon Rock display and an interesting Space Art display. Industry representatives filled exhibit

booths to excite young people about space and explain how their products and services were connected to the space program.

Astronauts, moon rocks, military units, the Civil Air Patrol, and young people launching rockets built with their own hands ... whew! As we know, one of the primary purposes of our Society is education of the public, and there is no better way to contribute to that purpose than participation in a program such as Rockets for Schools.

And what about 2004?

"We may have to cut back on some of our activities due to lack of voluntary response," says Foerster, "but Rockets for Schools will continue to be a primary project for us. We plan to have our booth again so both the student rocketeers and the hundreds of people who attend the event can see that the National Space Society is alive and well and working toward that human presence in space."

For more information about the Rockets for Schools program, you can log on to www.rockets4schools.org and find out how your chapter can participate or encourage a similar activity in your area.

G. B. Leatherwood is the NSS Director of Projects Chapters. He recently moved to Florida with his wife and two dogs. He is looking forward to warm rain, green grass, but most of all news of NSS chapter projects. He can be reached by email at gb1rel@bellsouth.net or proj-dir@nss.org, or by phone at (352) 686-2366 or by mail at 7213 Davenport Lane, Spring Hill, FL 34606-6348.



From the NSS Elections Committee Chair

The following members have successfully qualified for candidacy in the 2004 Board of Directors election. It is encouraging to see their energy and ability put to the task of advancing space exploration, and we can look forward to their contributions in the future. Those who seek office imbue vitality to our quest through their work and special projects as much as by the decisions to be made. Whether they individually advance to office or not we will all win by the efforts they each make in the coming years.

There are nine regional candidates eligible by petition and one eligible by nomination. Two regions are contested. The regional terms are for two years and officeholders may not succeed themselves.

The At-Large candidates run for a four-year term. There are 15 candidates running for 12 positions. Two candidates qualified by petition, nine qualified by nomination and four qualified by both petition and nomination.

The NSS Nominations Committee, chaired by director Greg Rucker, selected 14 At-Large candidates and one Regional candidate. One candidate subsequently withdrew.

I want to thank Greg and his committee members for conducting a wide and productive nominations process. The Nominations Committee consisted of Greg Allison, Marianne Dyson, Mark Hopkins, Jim Plaxco, Jay Wittner, and the late Cris Pancratz.

I also want to thank director David Baxter for assisting me as a member of the Election Committee as well as several senior members of the National Space Society for their counsel on issues that came before the committee.

Members and chairpersons of the Elections Committee and the Nominations Committee were selected by members of the Board of Directors in early 2003. Membership automatically expires once this election is over.

Your complete ballot must be received by Aug. 1, so please mail it by July 24.

—Harry Reed, Chair, NSS Elections Committee

CANDIDATES FOR AT-LARGE DIRECTOR

LAURENCE AHEARN

Nominated by petition and by the Nominations Committee of the Board of Directors

I have been a space activist for more than 30 years and an NSS member for almost 24. I believe that it is people like us, people who care about our future who will make a difference. We need to actively seek to improve public support, further education, support innovative approaches to space development. I don't have all the answers, but working with many at all levels who have contributed has shown me that we can progress toward our goal of a space-faring civilization if we work together. By small steps or great leaps, together we can make a difference. I hope that you will let me continue my work as a director and to work with you in the future.

I have been an officer and/or director since 1988. I am a former NSS vice president, chapters coordinator, chaired six committees, served on most NSS committees from Awards to Strategic Planning. Currently, NSS director; chair, Chapters Resource Committee, member of Awards, Bylaws, Chapters, Education, Membership committees, and Region 6 Chapters Organizer.

Nationally, as chapters coordinator (1989-94) I chartered more than 65 chapters in 57 months, developed Special Interest Group chapters, created regional organizers, and other innovations. Other achievements:

*Developed NSS placards seen on podia at many NSS events.

*Co-coordinator of NSS events at the 1996 Democratic National Convention with major media coverage.

*Co-founder of NSS Chapters Assembly.

*Program, logistics, and operations organizer and/or participant at 17 of last 18 International Space Development Conferences, and president of the highly successful 1989 ISDC.

*Testified before Congress, the National Commission on Space, and various government agencies.

*Co-created and wrote for the *Inside NSS* newsletter, published in *Ad Astra*, and many other publications.

*Addressed numerous public and education groups.

I am currently working on a membership incentive program. I am open to new ideas.

Locally, I am a charter member of the Chicago Space Frontier L-5 chapter and currently serve as the group's treasurer. I won the NSS Membership Recruitment Award by quadrupling membership in one year. I have personally recruited more than 400 NSS members to date. I co-chaired the 1995 Midwest Space Development Conference and helped start more than 15 chapters. I am an active participant in many conferences, conventions, seminars, and other activities and events.

I have received endorsements run from A—Greg Allison, chair NSS Executive Committee to Z—Robert Zubrin, president of the Mars Society and former EXCOM chair, and including former NSS president and three-time shuttle astronaut Charles Walker.

VOTE!

2004 NSS Board of Directors Election

☑ DALE AMON

Candidate nominated by petition

I have served NSS for many years in many capacities and am honored for the opportunity to do so again. I bring some unique attributes to the board as I have a foot in each of C.P. Snow's "two cultures"—I have worked and toured professionally as a singer/songwriter and worked as upper management in technology firms ... both on two continents.

My personal networks include much of the entrepreneurial space industry. My endorsers, including three time space voyager Charles Walker, show the breadth of my professional and activist credentials.

Dr. Scott Pace, a former board member and Washington space policy professional well-known inside the beltway: "Dale Amon has been a principled champion for the role of markets and liberty in space development that has helped NSS have a valuable and distinctive voice in space advocacy."

Christine Peterson, director of the Foresight Institute: "Dale has served NSS and its predecessor society for well over a decade. His understanding of coming technologies, especially nanotechnology, is vital to our strategy for space development and settlement."

Peter Kokh, ISDC98 chairman, *Moon Miners Manifesto* editor: "Through the years, Dale has been a lighthouse beacon for the cause of private enterprise in all sectors of space exploration and development. He has a clear vision of how we must, and can, open the space frontier to all. We need his voice on the Board of Directors."

Wayne White, ISDC02 Chairman notes my long service to the annual conference: "Dale ... has done an exemplary job as chair of the Conferences Coordinating Committee."

Other endorsers include activist leaders: John Strickland, Arthur Smith; NSS directors: Alan Wasser, Ron Lajoie; and ISDC90 and ISDC03 chair Pat Montoure.

I joined the society around 1979. I have served as board member (1984-88); chapter founder; regional and national conference chair; Spacepac chapters coordinator. I also have testified to the National Commission on Space; wrote a third-party presidential candidates space policy; served as conference coordinating committee chairman (2002-2004).

Outside NSS: I've been listed in *Who's Who in the World*; assisted Eric Drexler with pre review critique on *Engines of Creation*; co-invented with two others the Mikkelson Award for the first woman on the moon; soloed an airplane; published a paper in *Journal of the British Interplanetary Society*; ran a songwriter night in Belfast for seven years; a member of the Irish Music Right Organization; Tech Director of the first ISP in Ireland.

☑ GARY BARNHARD

Candidate nominated by the Nominations Committee of the Board of Directors

I am the owner and president of Barnhard Associates, LLC, a consortium of successful enterprises including, a computer VAR, a systems engineering consulting firm and an Internet Service Provider (Xisp.net) business based outside of Washington, D.C.

My work as a robotic/space/computer systems engineer, has included a wide range of robotic, space and computer systems engineering projects for government (NASA/DOD), commercial,

and non-profit/educational organizations. Recent work, directly applicable to NSS, has included the development and fielding of a custom Internet Protocol (IP) server/security gateway product (now in its fifth generation) that allows organizations to assert ownership over their relationship with the Internet and enable the full range of IP services (collaboration, web hosting, mail, list-serve, slashdot/discussion servers, etc.) on an affordable and effective basis.

Over the last 28 years I have been extensively involved in the space advocacy community as the co-founder and executive director of the Maryland Alliance for Space Colonization (MASC), viewed by many as one of the most successful chapters/affiliates of the L5 Society; the founder of the Space Development Foundation; a frequent public speaker on space advocacy issues; organizer of space-related educational programs/conferences, and a participant in many other space advocacy organization activities.

I hold a bachelors of science degree in engineering from the University of Maryland (UMCP), and was a grantee in NASA's Graduate Student Researchers Program. I am a Senior Member of the American Institute of Aeronautics and Astronautics.

Past positions include: member of the Technology Development Missions Working Group of the Space Station Task Force, and Executive Secretary of the Space Station Freedom Program (SSFP) Robotics Working Group.

Honors and awards include: a NASA Group Achievement Award for the Robotic Systems Integration Standards Interface Design Review Team, as well as an Outstanding Support Award from the Canadian Space Agency SSFP Liaison Office.

I believe the space advocacy community stands at a critical juncture. We can rise to the challenge of being architects, staunch advocates, and supporters of a reasoned evolution into a space-faring society or find ourselves left to twist in the political winds.

NSS can make a material difference in helping to provide for a positive future. The resources and proven abilities I can bring to the table can help make that difference. A vote for my candidacy is a vote to help see that difference realized.

Endorsed by: Greg Allison, CEC NSS.

☑ ERICH FISCHER

Candidate nominated by the Nominations Committee of the Board of Directors

As NASA reinvigorates for the future, so must NSS. Not since the merger of L5 and NSI has NSS been at a crossroads of such opportunity and such danger. Declining membership and a previous lack of NASA vision have challenged the viability of NSS.

The National Space and Satellite Alliance is a wonderful step forward, but can only be a start. It is crucial to increase NSS' relevancy to the public, government, industry, scientific community, and—most importantly—the membership. Our aspirations for NSS must be as aggressive as our aspirations for humankind's push to space. We must enhance our position relative to other advocacy groups, and we must give our membership an improved sense of involvement.

If elected, I will work to accomplish this by focusing on four areas:

*Continuing to increase our influence on government policy;

*Diversifying revenue streams to increase our financial stability, and launch programs that will excite the membership and advance our cause;

CANDIDATES FOR AT-LARGE DIRECTOR

*Developing alliances with industry to expand our presence and access new capabilities;

*Continuously updating the strategy for NSS to ensure long-term viability and relevance.

If you do not agree with the above, then I am not the candidate for you. But if you do agree, then you must ask why I am a better candidate than others in this strong field. I believe that I am the best choice because what we must accomplish requires a rare mixture of skills that includes more than a passion for space. It requires strategic vision, tactical leadership and the ability to work at the highest levels of industry, science and government. I hope you find that I have these qualifications. Briefly, I have spent:

*Six years working as a scientist with the U.S. and foreign space programs on the Galileo, Clementine and Phobos II missions, and quantifying the concentration of resources on the lunar surface;

*Three years developing strategy, building and running businesses as a senior director at Intelsat, the world's second-largest satellite services operator, transforming it from a non-profit to a commercial enterprise;

*Six years counseling executives of leading aerospace companies on critical strategic and operational issues as a consultant with McKinsey & Co, the top management consultancy.

Fellow members, this is a critical crossroads for NSS. I sincerely thank you for your consideration, and, I hope, your support. Endorsed by: Greg Rucker, NSS Vice President, Projects.

☑ MICHAEL FLYNN

Candidate nominated by the Nominations Committee of the Board of Directors

Mike Flynn is executive director of consulting services for a well-known firm in the field of quality management. For the past 20 years he has worked with client companies in a wide variety of industries to help them improve their quality management systems, train their workforces in problem-solving and statistical methods, and assist them in various projects for quality improvement and in specific problems of statistical analysis.

Clients have included commercial and manufacturing firms, chemical and pharmaceutical, and government and international agencies, including NASA-Houston and NASA-Goddard. Prior to this, he was a practicing quality engineer for 11 years. He believes that this background can help NSS improve the efficiency and effectiveness of its efforts to create a space-faring society.

Spaceflight has been an interest of his since childhood, when he wrote his first science-fiction stories in pencil in spiral notebooks, illustrated (badly) with Magic Markers. Since then, he has published several novels and numerous short stories in the science fiction field. He is the first winner of the Heinlein Award for fiction advancing the cause of a space-faring society. This was primarily in recognition of the FIRESTAR series of novels, which traces the history of a private attempt to mobilize the world against the potential threat of near-Earth objects. His fiction has won the Sturgeon Prize, the Compton Crook Award, the Libertarian Futurist Award, and has been on three occasions a finalist for the Hugo Award. This background can help NSS in its efforts to communicate and advance the objectives of NSS in the society at large.

Flynn holds a master's degree from Marquette University in mathematics, and is the proud originator of a single original the-

orem in general topology, the actual usefulness of which is open to debate. He has also served as a grubby politician: working in the trenches as precinct committeeman, district captain, and House district leader as well as on several major campaigns and at caucuses, assemblies and conventions.

He believes that in process improvement it is important not only to assess accurately the "as-is" state and to envision the "should-be" state that we hope to achieve, but also to define pragmatically the "could-be" states that line the way from the former to the latter. Hence the commitment to "growing" a presence in space in a series of moves each one of which holds out the promise of profit and beneficial results.

☑ DANA JOHNSON

Candidate nominated by petition and by the Nominations Committee of the Board of Directors

I am honored to be a candidate for the Board of Directors again for a second four-year term. If re-elected, my background and profession in space policy and programs will serve the National Space Society and its members by helping to articulate our vision to the wider space community in the United States and internationally.

I have worked in the space field for more than 20 years for a number of aerospace companies, including nearly 15 years at the RAND Corp., where I conducted research and analysis for the Department of Defense, the intelligence community, and NASA. While at RAND I was co-principal investigator on several NASA projects, including a congressionally mandated study of NASA's aeronautical test and evaluation facilities (wind tunnels).

I supported various presidential and congressional commissions, including the Aerospace Commission (2001-02), the NIMA Commission (2000), and the Commission on Roles and Missions of the Armed Forces (1994-1995.) In June 2003 I joined the Northrop Grumman Analysis Center as a senior analyst assessing space and missile defense policies, trends, and issues for the corporate and related business sectors of the company. In that capacity I work with public policy organizations throughout the Washington area to examine the range of perspectives on space and missile defense issues of interest to Northrop Grumman.

My expertise includes national space policy, strategy, organizational responsibilities and management, space support to military operations, and international and commercial space policies and programs. I have led numerous studies, written several books on space issues, and lectured in domestic and international space conferences, including ones in Australia and Israel. For the past three years I have taught a masters-level class on outer space and security at Georgetown University. I have a doctorate in International Relations from the University of Southern California, where my dissertation addressed the evolution of military space doctrine.

In the past four years, I have served as the Awards Committee chair and as a member of the Policy Committee. I have supported the efforts of the board in taking a professional, structured, and organized approach to achieving Society objectives through strategic planning and implementing the Society's goals through the Roadmap. Furthermore, I believe our international members bring a unique perspective to NSS that complements and enrich-

VOTE!

2004 NSS Board of Directors Election

es the Society as a whole. If re-elected, I look forward to working with you to articulate NSS' vision and core values, expanding our membership, and supporting space development.

☑ MARGARET JORDAN

Candidate nominated by the Nominations Committee of the Board of Directors

I ask your support for my election to the National Space Society's Board of Directors. If elected, I pledge to be an active Board advocate for our shared vision of making space a place for people to live, work, learn and play. I, like you, am motivated by a personal desire to live and work in space. I believe that by encouraging as many different space development interests, ideas and programs as possible, we will achieve our ends that much more quickly.

As a member of the board, I will support and encourage an inclusive approach, seeking to involve as wide a group of space activists as possible. I will work to include and support our international members, and bring them fully into all of our programs. I will support cooperative programs with other space advocacy organizations, to most effectively advance our message and our goals. I will also exercise the financial and organizational oversight needed to create the strong foundation from which to promote our vision.

I have served you previously as both a Regional and an At-Large board member, and as a member of the Executive Committee, several years ago. I seek to return to the board to bring a revitalized effort to extend our vision to a new generation of space supporters, and to enlarge and strengthen the organization overall. Professionally, I am a space systems engineer, having 18 years of experience working in the development of commercial and military space programs. I have been an active advocate for commercial space development, and an entrepreneur in this field. I am also a physicist by education, a mom, an amateur astronomer and a high-power rocketry enthusiast.

In pursuit of our "impossible dream," I offer this bit of encouragement from Edgar A. Guest's poem titled "It Couldn't be Done."

*There are thousands to tell you it cannot be done,
There are thousands to prophesy failure;
There are thousands to point out to you, one by one,
The dangers that wait to assail you.
But just buckle in with a bit of a grin,
Just take off your coat and go to it;
Just start to sing as you tackle the thing
That "cannot be done," and you'll do it.*

Thank you for considering me as a candidate for the NSS Board of Directors and for your support and participation in NSS, the organization of and for the space activist.

☑ RON LAJOIE

Candidate nominated by petition and by the Nominations Committee of the Board of Directors

I am seeking your support in continuing to serve as one of your Directors. If re-elected, I will continue to strive to ensure that NSS is healthy financially and administratively, and that NSS chapters and activists receive the resources (information, money,

materials, training) you need to be effective out in the field—especially now that the door back to the moon and on to Mars has finally been reopened!

My re-election has been endorsed by the NSS Nominations Committee, Chapters' Assembly chair David Stuart, NSS director Larry Ahearn, and NSS vice presidents Jay Wittner and Cliff McMurray (who wrote "Ronnie Lajoie is one of the hardest workers on the NSS board.")

During my two terms as chair of the NSS Chapters' Assembly (1995-1999), I conducted numerous chapter surveys, created the Assembly website, and reshaped the Assembly into an organization to help chapters help each other to thrive. As an NSS Advisor (1997-2000), I participated in two strategic planning workshops plus a policy summit, and helped draft our Statement of Philosophy and associated NSS Roadmap documents.

Since becoming your director in 2000, I served as a member of the Public Affairs Committee (and now Membership Committee) and continue to maintain our Philosophy and Roadmap documents. I serve as a member of the Policy Committee and drafted the initial versions of our ISS Visitation Policy and our recent "Next Steps for Human Space Exploration" policy. I have participated in all strategic planning workshops, board meetings, and invited executive committee meetings; and have worked hard to clear "dead wood" off the board to make room for dedicated and active NSS members. I also served as chair of the Elections Committee.

I serve as a member of the Chapters Committee and associated Chapter Resources Subcommittee, and have worked to provide chapters with the resources they need, including NSS signs and banners, and money for chapter projects. I maintain the Chapter database, currently in Excel, and am hard at work on a Web-based online database for NSS activists and chapters.

I joined the NSS in 1991, then the Huntsville chapter (HAL5) in 1992, and have been a HAL5 officer since 1993. I have served as HAL5 newsletter editor, webmaster, and Project HALO team member. Professionally, I am a space systems engineer with 18 years at the Boeing Co., and have degrees from both Boston University and M.I.T. I have been an NSS Visionary Donor since 2001.

☑ JEFFREY LISS

Candidate nominated by petition and by the Nominations Committee of the Board of Directors

I have spent two decades serving NSS and promoting its vision. With the U.S. Return to the Moon/On to Mars initiative, we have a new window of opportunity to get beyond Earth orbit. I want to continue as a director to help generate the political and popular support needed for "a space program that goes somewhere."

I am supported for re-election, by, among others, NSS Governor and Apollo astronaut Jim Lovell, whom I assisted on special NSS projects, space visionary Robert Zubrin, and former chief astronaut and former NSS President Dan Brandenstein, who stated: "I have worked with him over the years and he has contributed a tireless effort to the realization of the goals of NSS. He has my strong endorsement for this election to continue his contributions to these goals."

NSS activities: Currently, senior vice president and member of the Executive and Policy committees (working to

CANDIDATES FOR AT-LARGE DIRECTOR

improve NSS operations, policy formulation, intra-organization communications, including initiating NSS Online Report.) Previously, chair of Conferences and Nominations committees, member of Budget Committee and editor of chapters newsletter, *Inside NSS*.

I have: represented NSS at events ranging from scientific conferences to SF conventions, and on radio and TV programs; lobbied politicians; chaired NSS' 1989 International Space Development Conference; vice-chaired the 1994 ISDC; arranged Spaceweek events; received NSS' Activist of the Year Award; written numerous articles and letters for newspapers and NSS publications; prepared NSS Resource Packets.

NSS Chapter Involvement: I have always worked with chapters, am a founder of two, vice president of one, and originated and served in the Chapters Assembly.

I have been endorsed by Peter Kokh, editor of *Moon Miners' Manifesto*—NSS' most widely read regional newsletter. Peter wrote: "Jeffrey has worked indefatigably on behalf of the Society. He is a 'working director,' who can be counted on to do everything asked of him and to find even more to contribute on his own."

Goals for NSS:

- * Seek out, publicize and promote innovative space technologies.
- * Support both governmental and private space efforts.
- * Support laws facilitating commercial space activity.
- * Enlist civic leaders, celebrities, and other organizations in the

pro-space movement.

- * Strengthen NSS' leading grass roots role promoting human space flight.

Goals Within NSS:

- * Enhance NSS operations using my professional and managerial experience as an NSS and Brown University Alumni Association director, and as a lawyer and assembly member and section chair of the Illinois Bar Association.

- * Create opportunities for member participation and chapter growth.

BRIAN LUNDQUIST

Candidate nominated by the Nominations Committee of the Board of Directors

More revenue is what the National Space Society needs most. If elected, I will raise funds. I have a great deal of professional experience in this area. This includes raising funds for political campaigns and for non-profit organizations, like the National Space Society (NSS). For example, I have been in charge of the Republican Party's efforts to raise funds by direct marketing from donors in the United States for up to the \$1,000 bracket.

I will also make use of my extensive political experience to promote the Society's agenda. I have been the manager of an Oregon State Representative campaign and of the Southern Oregon Region for a United States Senate campaign.

I am a long time space activist.

I have previously served on the NSS board.

I have served as chapters coordinator of NSS' North West Region.

I am the founder and first president of NSS' Southern Oregon Chapter.

My endorsements include Dudley Lynch, author of *Mother of All Minds*, who is well known for his views, which provide a com-

PELLING philosophical rationale for humanity's advance into space.

I am founder, president and 80 percent owner of 7th Wave, Inc. We have made a great deal of money by pioneering Internet products. Our clients have included Fortune 500 companies with billions in annual sales, such as Barnes & Noble and Charles Schwab.

One of our recent products is the top Internet portal for information about nanotechnology. NASA, Foresight Institute, Discovery Channel and *Science* and *Discover* magazines all recommend it as the best.

It is my belief that the increased use of private enterprise can greatly accelerate humanities movement into space. As a successful entrepreneur, I can provide the board with insight concerning how to bring this about.

The incredibly rapid growth of the Internet in capability and importance is creating a new world for non-profit organizations, where the Internet will be central to publicity, membership growth, fund raising, and the internal organization of members.

I know how NSS can use the Internet to raise funds.

The goals of NSS are at the cutting edge of what is important for humanity. It only makes sense that we as an organization are at the cutting edge of non-profit organization development. As a board member, I will work to ensure that this happens and as a consequence that our dreams move dramatically closer to reality.

BRUCE MACKENZIE

Candidate nominated by petition

NSS needs to spend more on its vision of permanent settlement of space and education. It concentrates too much on political influence and fund-raising letters to the membership.

My vision is that children will know there is a future for them beyond the crowded cities of Earth. With hundreds of settlements throughout the solar system and essentially unlimited resources of space, we can experiment with new ecologies and new societies, applying those lessons to managing the Earth.

Please consider all 'petition' candidates. I am willing to bring issues to the board's attention, even if they are sensitive or hurt my own future nomination. I have pointed out that the NSS was rapidly spending funds. I was brave enough to make a motion to terminate conflicts of interest. I have repeatedly pointed out the inherent problems of giving directors so much influence.

I repeat my offer to try to bring up board motions on behalf of members and chapters. The board rarely approves anything not approved by committees. Recently, rules were changed (by a one-vote margin) to require four co-sponsors for mail-vote motions. This makes it impractical for new or regional directors to push new initiatives without major effort building a coalition or trading favors. I will continue to work toward a more streamlined and efficient decision-making process.

The Mars Society gave a high honor: Pioneer of Mars Award "for years of dedicated service to the Mars Society and Membership." I try to give the same help to the NSS. With support from CyberTeams.com, I set up free web domain for Mars Society chapters, which now has thousands of contributed files and photos. Current fiscal problems have now prompted NSS to accept volunteer help, which I am helping plan.

I will also promote: chapters, special interest groups, member involvement in committees, speaker bureau, education.

VOTE!

2004 NSS Board of Directors Election

I was one of the few regional directors to actively solicit input in my region. I arranged monthly speakers for my chapter for six years; began the NSS-Discussion e-list, and electronic distribution of NSS *SpaceViews* newsletter.

Elsewhere: past interim executive director of the Mars Society, volunteer for SSI, AIAA's New England Council. I have worked on space shuttle software, Kistler's reusable launcher, GPS receivers, orbital tethers and permanent Mars habitats.

Endorsed by: Frank Sietzen, Charles Walker, Ronnie Lajoie, Larry Ahearn, Jay Wittner, Jim Plaxco, Dale Amon, Francis Govers, Arthur Smith, Elaine Walker, Ned Dodds, Wayne White.

CLIFF McMURRAY

Candidate nominated by the Nominations Committee of the Board of Directors

Who speaks to humanity about a more hopeful future beyond the boundaries of its birth planet? Sadly, the space movement has fragmented itself as thoroughly as did the church during the Protestant Reformation. Each space advocacy group claims to have the Pure Vision of Truth, the One True Gospel about what our future should be and how we should get there. This clamor of competing voices leads to confusion in the minds of the public and of politicians, and our cause is not advanced.

What is needed is an organization that represents not the least common denominator of the space movement, but the greatest common denominator—an organization which will act as a focal point to draw the movement back together and enable it to speak with a clearer, louder, more persuasive voice. NSS can and should be this organization. To be an effective voice for change, however, mere enthusiasm for the cause is not enough. NSS needs leaders with both vision and the ability to manage its resources—both people and money—effectively.

My background and qualifications: After a successful career as a systems analyst in the insurance industry, I returned to school for my MBA. Graduating summa cum laude, I followed this degree with a year of post-graduate studies of the European space industry on a Fulbright scholarship in Germany. Recently returned to the U.S., I am presently pursuing a second career in the finance industry. I am also a pilot (Commercial, Instrument and Multi-Engine license, 1300+ flight hours) who has served in the Civil Air Patrol as a search and rescue pilot, Emergency Services Officer (Kansas Wing) and Aerospace Education Officer (Wichita Squadron).

A frequently invited speaker on aerospace topics, I have published several magazine articles on space issues. I am a lifelong space activist. In addition to my work with NSS, I am a member of the Space Studies Institute, British Interplanetary Society, Mars Society, and ProSpace.

NSS offices held: Fundraising Committee member 1998-2002, Board of Directors 2000-2002, 2003 Washington Legislative Conference chairman, Executive Vice President 2003-present, Policy Committee Vice Chairman for Political Action 2003-present.

KEN MONEY

Candidate nominated by the Nominations Committee of the Board of Directors

Even before Gagarin's first orbital flight in 1961 I was working to

prepare myself to help humans create space colonies independent of planet Earth. I have taken a few detours along the way, but I am still making contributions to this end. The best structure for success here is the National Space Society, and I have worked on the NSS board of governors since 1986. Now the time is right for me to work also on the board of directors. My background and training have prepared me.

I am a Canadian and a former RCAF fighter pilot. On two occasions I piloted successful search and rescue missions in northern wilderness using float equipped Otter aircraft. I am expert in areas of flight safety. In May 2000 I received the Kent Gillingham Award from the (U.S.) Aerospace Medical Association for contributions to knowledge of disorientation and situational awareness.

I teach part time at the University of Toronto where I received a doctorate in physiology in 1961, and I have published more than 100 scientific articles. I have been a co-investigator in experiments on six shuttle missions. From 1984 to 1992 I worked with NASA in Huntsville, Houston, and Cape Canaveral, as a Canadian astronaut, and in 1992 I was the Spacelab Payload Operations Controller for the International Microgravity Laboratory mission. I also was the alternate payload specialist for that mission, qualified and trained to fly if needed. I chaired the Human Factors Committee for the Mars mission, in the International Academy of Astronautics, and was editor and co-author of its report (1993).

There are some other things in life, too. I enjoy badminton, skiing, aerobic flying, skydiving, fishing, bridge, reading, and grandfathering. I competed in the 1956 Olympic Games in Melbourne and placed fifth in the high jump. I avoided the idea that jumping high in the air is important. In January 1999 I won the US masters badminton championship in my age group at the international championships in Miami, Fla. Badminton, of course, is important. I also invented and demonstrated an experimental surgical operation (semicircular canal plugging) that, modified, is used occasionally in North American and European hospitals to cure dizzy spells.

I have served as corporate director on two for-profit boards and two not-for-profit boards. I have recently completed college courses in accounting, management, and corporate governance.

YVONNE SPENCER

Candidate nominated by the Nominations Committee of the Board of Directors

This statement addresses my professional belief, experiences, scientific knowledge and support for continuous involvement in space exploration.

The year 2004 ushered in old knowledge and new facts that were the results of innovative space exploratory activities. Continuous innovative, highly technological and scientific-oriented work is the key to accomplishing our futuristic goals of living and working in space.

For those of us who believe in the benefits of the living in space concept, it seems to be the dawn of a new day. We are now able to progress, determine and develop different ways of space exploration plans and actions. While advances are clearly presented, there is a tremendous need to improve and work harder in the education programs, both in science and technology. Human factors research is an urgent activity because of the important physi-

CANDIDATES FOR AT-LARGE DIRECTOR

cal data available to improve the quality of life for persons in land, space, or sea.

I am a nurse educator, researcher, administrator and practitioner in the largest group of professional health care providers. After 15 years of work in space exploration studies, I am extremely excited about what I have achieved while studying exploration of space.

My research presentations, "Futuristic Views of Living and Working in Space," generated interest in the nursing groups. In addition, I created a production titled "Spin-off-to Space," a space science education program for middle school and high school students, which was offered as a choice for summer activity on this university campus with tremendous enrollment.

My involvement in the study of space exploration includes membership in many organizations such as Space Nursing Society (one of the four founders, past president), Sigma x (the Scientific Research Society) and United Societies in Space. I am also a member of scholarly organizations including Sigma Theta Tau (International Nursing Honor Society), and many others throughout the years.

The Future of the development of the space environment is a required agenda for this global scientific population. I believe I have many characteristics, such as research inquisition, to share.

This candidate is endorsed by NSS Board of Directors CEC Greg Allison.

☑ PHILIP YOUNG

Candidate nominated by the Nominations Committee of the Board of Directors

I am standing for re-election to the NSS Board of Directors because I fully subscribe to the NSS vision, have a strong and abiding desire to help carry out the NSS mission as best I can, and have the experience, abilities and outlook to make an effective contribution.

At present I am a director of projects for NSS with responsibility for Dream Book projects. With the changes at NSS, the Alliance and the new landscape brought about by NASA's new focus on returning to the moon and then going to Mars and beyond, there is a lot of work to be done in this area. Now that the goals have been set, we need to ensure that our efforts are aimed at supporting, and extracting as much leverage as possible from, these new realities. I am very much looking forward to the challenge.

My job is network coordinator of the Australian Space Network. This is a grouping of universities, government research organizations and private industry whose purpose is to more comprehensively address opportunities in space, undertake space technology transfer and raise the profile of space activities in Australia. I have been chairman of the annual Australian Space Science Conference since its inception in 2000 and am an Executive Council member of the Australian Space Industry Chamber of Commerce. As a result, I have excellent contacts in both the scientific and industrial arenas.

Bearing in mind that NSS is an organization of some thousands people in a world of six billion, we need all the leverage we can get. This means not only political action in the United States, but also giving a voice to the many people in other parts of the world who may not be fortunate enough to have much home-grown space activity but even so have a hunger for the future which NSS espouses.

As an Australian, I would very much like to give further impetus to our international efforts, especially now that President Bush has invited the rest of the world along for the journey. I originally joined NSI in 1979. I have served as Sydney Space Frontier Society president, have been an NSSA director since 1996, served four years as Australian National President and am now deputy chairman. I bring to NSS a philosophy of "eyes on the stars, feet on the ground."

CANDIDATES FOR REGION 1 DIRECTOR

☑ CRAIG WARD

Candidate nominated by petition

I share the vision of a civilization that spans the solar system. As a member of the Board of Directors I will, to the best of my abilities, work to further the goals of the Society. Having served on the Board of Directors in the past, I feel that I have the necessary experience to work with the other directors and the membership. Also, I have been a leader in the Los Angeles chapter since the early 1980s and I have been a member of the Orange County chapter for several years. I currently administer the email lists and web site for the Los Angeles chapter.

A key contribution that I can make is to help enhance the utility of the NSS Internet program, especially in the area of effective fund raising. By incorporating fund raising into the NSS Internet program, we can harness additional resources for NSS programs on all fronts.

The Internet is a valuable tool for organizing, educating, and communicating. It needs to be put to better use than it currently is.

As a member of the Board of Directors, I will endeavor to attend the annual meetings of the Society and will, to the extent family and career allow, attend other meetings and events of the board and fulfill the expectations of an NSS director.

A director must take a leadership role, but that does not mean just telling others what they should be doing. Leaders must be able to listen and take notice of many opinions and points of view and attempt to navigate the best possible path forward. If elected, that is the attitude that will I bring to the board.

Endorsements: The Board of Directors of OASIS, the Los Angeles Chapter of NSS. Steven Bartlett, President OASIS; Larry Evans, President Orange County Space Society (OCSS); Mark Holthaus, former Director, Region 1; Seth D. Potter, current Director Region 1.

CANDIDATES FOR REGION 2 DIRECTOR

☑ EDWARD DODDS

Candidate nominated by petition

"Since the birth of its ancestors the National Space Society has become the largest, wealthiest, best known, best respected United States space exploration advocacy organization of all."

VOTE!

2004 NSS Board of Directors Election

This goal comes up a lot while I contemplate NSS' history since the 1987 L5 Society/National Space Institute merger (I was a member of both). If NSS is not the biggest and best, why not? Are we missing some prospects e.g. people who lack computers and don't do email? Have *Ad Astra* and the NSS web site, the Society's main ambassadors, represented the Society well? How have other organizations achieved success?

With experience: (1) as an officer on a U.S. Navy destroyer, (2) in project management on heavy construction projects for 17 years, (3) as a full-time public high school classroom science teacher for 12 years, and (4) as member of solar system exploration advocacy groups for 20 years, including two terms as an NSS chapter president, it's time to increase my active involvement.

We CAN show NSS' democratic nature more clearly and make NSS more fully accessible to all members and prospects in *Ad Astra* and on the website by: (1) adding Regional Directors names and contact information to chapter lists, (2) identifying Director's terms and expirations and (3) displaying Board of Directors' working committees' existence and activities.

We can better identify and implement what NSS does best. If it's legislative action, we can list and discuss interesting legislation in *Ad Astra* and on-line.

I believe the number of directors doesn't matter. A rowboat with four, eight or 250 oars (ask me about a picture of 250 oars!) works as long as they all pull together. I also believe all NSS directors have had only the best interests of NSS at heart, though some may feel strongly that their's is the better idea. And I believe the bylaws provisions requiring Regional directors to wait two years for re-election, to either Regional or At-Large, while allowing At-Large directors to be re-elected to unlimited consecutive terms, can inadvertently limit board membership to a small group. This might exclude talented individuals of benefit to the Society, first introduced as Regional Directors.

Endorsements: Pat Montoure, Chairperson, ISDC 2003 and Bruce Mackenzie, Director, National Space Society.

CANDIDATES FOR REGION 3 DIRECTOR

☑ TOM KOSZORU

Candidate nominated by petition

My name is Tom Koszoru. I work for the second-largest employer in the United States. (Once number one, but we continue to slowly reduce employee positions.) We earned a \$4 BILLION profit in 2003. I hold an upper management position as a maintenance engineering analyst, and with my partner, we manage the maintenance concerns of seven national high impact systems in this organization (thousands of large machines). We write technical bulletins concerning safety, periodic maintenance, software modifications, and hardware modifications for these systems. We assist with decision analysis reports for funding and maintenance portions of the statement of work for vendors. We provide oversight for technical manuals, training, and first article tests. I work for the U.S. Postal Service. An ENFJ according to Myers Briggs analysis, I hold an

MSBA from Boston University and the equivalent of an engineering degree.

Platform: My goal is to make the NSS financially viable through the adoption of a SPECIAL national charitable fund within the NSS, for student space projects. I would work with the NSS chapters to create various national fund raisers, where the chapters would do something more than pass the hat, or increase membership. The NSS chapters would create and agree to work these fund raisers together with NSS directorship approval. I believe both the fund and chapter's team work would bring in new members and revitalize the NSS to the American public.

☑ JOHN STRICKLAND

Candidate nominated by petition

Platform: The National Space Society, as a space advocacy organization, is now at a critical point in its history. To ever achieve our long-stated goal of a free space-faring civilization, our Society must take a public stand for policies that encourage large reductions in the cost of space operations by increasing the role of private enterprise, and re-direct our national space program back toward true exploration and space development.

We must also provide the tools and information necessary for our officers, chapters and members to effectively promote our views to the public, media and government. We should act in good faith as a member of a community of other organizations with similar goals.

Service: I joined the American Rocket Society as a student member in 1961. In 1975-76, I joined both the National Space Institute and the L-5 Society—"parents" of the NSS. I have been the chairman for the Austin Space Frontier Society from its founding in 1981 to the present. I served in 1988 as the creator and designer and since as the coordinator (and sometimes builder) for the Heinlein award. I worked on the design and production of the Von Braun Award.

In 1988, I was a founder of the NSS Chapters Assembly, and have served as one of its officers. I am a director of the Sunsat Energy Council, and an active member of several other pro-space organizations. My specific interests include access to space and reusable spacecraft, space policy, space solar power, and planetary and lunar base infrastructure.

I have written many articles including: a chapter in the 1998 edition of Dr. Peter Glaser's book on solar power satellites, and in 2003, a chapter for the new Boy Scout Merit Badge Manual on Space Exploration. I have twice been able, as a (moderate) delegate to the Texas State Republican Conventions (2000 and 2002), to insert specific pro-space wording in their planks. I have attended every single Space Development Conference and will continue to attend them and all critical Society events and directors meetings.

Endorsements: NSS directors Larry Ahearn, Marianne Dyson, who said, "John's ability to analyze political and media reactions, and his willingness to volunteer his time, make him well qualified to serve," and Ronnie LaJoie.

Others: Dale Amon, Carol Johnson, president North Texas NSS, Peter Kokh, Clifford McMurray, NSS executive vice president, who said, "John is knowledgeable, passionate, and conscientious," Dr. Carol Redfield and Joe Redfield, NSS treasurer.

CANDIDATES FOR REGION 4 DIRECTOR

☑ GEORGE HOWARD

Candidate nominated by the Nominations Committee of the Board of Directors

I have been an NSS member since 1993, a chapter leader since 1996 and a Regional chapters organizer since 2002. With this track record I have developed an idea of what improvements need to be made to build the organization.

People: Chapters need to build contributing membership. This may require assistance from the national organization in the form of seed money to do mailings and provide gift memberships to contribution-minded people in the community. Chapters currently have very little operating capital.

Product building: In addition to *Ad Astra* magazine as a product, chapters need to establish free-standing meeting centers with the contributions from contributing members. This provides members with a tangible benefit to participating in the organization.

Projects: Chapters need to have projects to keep members interested on a local level, in the form of “workshop programs” that members pay a small amount to attend. This covers the cost of the project. An example: an alternative energy workshop, providing information members can use. I do not feel chapter projects should be funded with money from the national organization because it does not generate much new membership. I think that I can make significant contributions to the advancement of the National Space Society. Region 4 Chapters Organizer.

CANDIDATES FOR REGION 5 DIRECTOR

☑ WILLIAM GARDINER

Candidate nominated by petition

If elected, I will work from the board level to reinvigorate NSS chapter participation in the pursuit of our goals. Still unique to non-aerospace industry space advocacy groups, local chapters form the backbone of our efforts. But they have suffered from feast and famine cycles of interest and participation.

This has been equally true of my home chapter, NSS Atlanta. But during my first tenure on the board in 1990-1991, I participated in initiatives which addressed what I still believe to be the fundamental cause of chapter down cycles: a feeling of non-participation in space exploration.

The first initiative, which began after joining one of NSS' predecessor organizations, the L-5 Society in 1975, was to develop a local U.S. congressman as a pro-space advocate. This we did with Newt Gingrich. Newt was directly encouraged and received support from then-Pres. Ronald Reagan for the International Space Station (ISS) in 1984 and subsequently from President George Bush in 1990 for the first Space Exploration Initiative.

The second initiative was to promote cooperation with the

Russians during the final stages of the Soviet period, which we did by urging in-principle sharing of technologies developed for the Space Defense Initiative (SDI). This culminated in December 1991 with a telephone conference we arranged among Newt, Maj Gen.-cosmonaut Vladimir Dzhanibekov and my oldest son's fifth-grade class, which was then studying flight. Newt gave Dzhanibekov broad assurances and a week later the Soviet empire closed for business, followed a few years later by multilateral cooperation on the ISS. Our Russian partnership has been shown to be essential to the ISS since the Columbia mishap and I continue to support these efforts.

The third initiative was the formation of a special physics interest section of NSS Atlanta. This was based on a proposal I presented at the NASA-sponsored “Vision 21” symposium at Glenn (Lewis) Research Center, Cleveland, Ohio, to develop “faster-than-light” (FTL) communications and to make this a steppingstone to propulsion methods that couple to the space medium. Now in 2004 FTL communications is a laboratory reality. This has led me as an environmental chemist to promote a view of natural chemosynthesis and the genesis of biologically active planets as transmitted co-processes that when understood at all levels will lead us to find, to reach, and to form habitats suitable for our settlement and expansion.

CANDIDATES FOR REGION 6 DIRECTOR

☑ WILLIAM HIGGINS

Candidate nominated by petition

No statement was provided by this candidate.

CANDIDATES FOR REGION 7 DIRECTOR

☑ MICHAEL FULDA

Candidate nominated by petition

Member for about 25 years of the NSS and of its precursor organizations. Past Regional Director of L-5 and NSS; Recipient of the 1993 Spacepac Outstanding Service Award and the 1998 Spacecause Outstanding Achievement Award.

President of the Institute for the Social Science Study of Space, (co-sponsor and participant of ISDCs 94 through 01); associate fellow of the AIAA, member of its Public Policy Committee, and president of its Allegheny-Pittsburgh section; fellow of the British Interplanetary Society, advisor of the Sociedad Espacial Mexicana and the Bauman Moscow State University Youth Group; and regular member of the AAS, National Space Club, Mars Society, Planetary Society, Asociacion Argentina de Tecnologia Espacial, and the Deutsche Gesellschaft for Luft und Raumfahrt.

Doctorate in international studies and undergraduate studies in political science and engineering. Professor of political science

VOTE!

2004 NSS Board of Directors Election

at Fairmont State University, specializing in U.S. space policy. Director of the West Virginia Space Grant Consortium.

While on sabbatical leave during the fall 2002 semester taught a course on U.S. Space Policy at the Moscow Bauman Technical University (the Russian MIT). Published a number of articles on space issues. Testified in Congress on US-Russian cooperation in the human space program.

Spent two summers as faculty fellow at the NASA Marshall and Langley centers and one summer at NASA Headquarters as an International Relations Specialist working on space transportation issues. Director of Space Policy and national coordinator for the space constituency for the 1980 John Anderson Presidential Campaign. Advisor on space policy issues to the Glenn, Dukakis, and Clinton presidential campaigns. Governor appointee as West Virginia delegate to the Aerospace States Association.

Michael Fulda is listed in *Who's Who in America*, *Who's Who in the World*, *Who's Who in Science and Engineering*, *American Men and Women of Science*, *Who's Who in American Politics*, *Who's Who in American Education*, and in a number of trade directories.

Campaign statement: It seems that only once per generation a constellation of political, institutional, international and technological factors align themselves to produce major changes in U.S. and world space policy. Such an opportunity has come again. It is time for new and aged dreamers alike to join forces to propel us *ad astra*. As a space policy teacher and advocate of long standing I pledge, if elected, to represent again our region with the best of my abilities.

CANDIDATES FOR REGION 8 DIRECTOR

☑ DONALD DOUGHTY

Candidate nominated by petition

I'm an electrical engineer with experience on the following projects: the FMV Dynamic Flight Simulator, a high performance training and aeromedical centrifuge (See Jan. 5 *AV Week* cover); Fiber Optic Data Transmission Systems at Bell Labs; the Scorpius Rocket Sequencer and a Test Stand Data Acquisition System; and an Airplane Passenger Communication (Phone) System. I am a member of the following organizations: AIAA, Reaction Research Society, and Space Access Society.

NSS accomplishments and endorsements: As a member of the Boston chapter, I successfully mobilized a grassroots' network to restore FY2000 NASA Space Exploration funding and worked in the past to keep the DC-X rocket flight test program funded; set up the first NSS majordomo e-mail lists and now manage the delta-clipper@TheWorld.com e-mail list which now tracks sub-orbital and RLV issues; designed interactive displays and ran model rocket workshops for Science Exploration Encounters (SEE); organized the effort to council the Space Exploration Merit Badge at two BSA Jamborees; been chairman of the Chapter Assembly Administration Council; founder of the NH chapter and past president of the Boston chapter.

Greg Allison, chairman of the NSS Executive Committee, has endorsed me.

NSS policy: As a member of the Board of Directors I will work toward the following: have the membership surveyed and organize a Political Action Network; establish state contacts for areas not served by chapters and support funding for regional chapter coordinators. Also, I will encourage *Ad Astra* to publish issue themes, article submission deadlines and writer guidelines on the NSS HQ web page. In the area of national space policy, support the space start-ups Reusable Launch Vehicle (RLV) efforts to provide cheap access to space and support their potential customers.

Finally, grassroots support is essential. Boston will be the site of the 2004 Democratic National Convention. I am helping to organize NSS visibility and efforts to work the press. If we are going to make the president's plans to go back to the moon a reality.

☑ ARTHUR SMITH

Candidate nominated by petition

I was four when Neil Armstrong took his one small step, and my childhood space interest led later to a physics Ph.D. I've worked in research, helped start a software company, and currently manage a software development group for the premier physics membership organization, the American Physical Society (APS).

Reading Gerard O'Neill's *High Frontier* rekindled my space enthusiasm, and I joined NSS in 2001. I was elected to the Moon Society Board, helped with the Moon track at the 2002 ISDC (NSS annual meeting), and organized a Long Island NSS chapter. We've built a mailing list for our own and other local space-related activities, and held local outreach events promoting NSS at conventions, museums, and research institutions.

At the 2003 ISDC, I was elected secretary of the chapters' assembly, and I help maintain the NSS chapters' web site, including a collection of NSS policy statements. I currently serve on an ad hoc redesign committee for the main NSS site.

I have written many advocacy articles on space development for online and print publications; I also edit the space colonization section of the Open Directory Project (Google's web directory). My writing advocating for solar power satellites and lunar solar power has appeared in *Space Daily* and the APS Forum on Physics and Society.

I have enjoyed meeting members of other NSS chapters in our region. If elected as regional board member I want to be accessible, and to represent your concerns. Our region has a strong international character and great potential for growth. We need to use the Internet for outreach; we also need a physical presence through chapter and individual member activities, and I will work to facilitate both.

The mission of NSS, to advance the day when humans will live and work in space, is as critical as ever. The potential is there for great progress in the near future, and I pledge to dedicate my time to help NSS accomplish its important mission.

Endorsements: Arthur Smith is endorsed by NSS directors Marianne Dyson and Bruce Mackenzie, and former Region 8 board member and New York City chapter president Elaine Walker. Dale Amon, conference coordinating committee chair, writes: "Arthur is a hard-working activist at both regional and national affairs. He has expended great effort creating excellent ISDC program tracks each year since I have been the Chairman of the CCC." 🐦

MORE THAN ONE BATTLE

IN THE PAST SEVERAL WEEKS, THE CHANGE IN U.S. NATIONAL space policy to focus on human exploration beyond Earth orbit has gotten a fair amount of attention in the press. A lot of that attention has been negative, though, and the press has already turned most of its attention to the issues that occupied the headlines before the president's announcement. That's not really surprising.

The issues that most easily occupy the attention of the national press corps are important to the future, too. Can anyone blame them if they're more concerned with the war on terror, the rebuilding of Iraq, and mounting federal and trade deficits? Who has time to think about the future when the concerns of the present are so urgent?

We do.

It's our job to make sure the American people and their leaders don't forget that the future they're fighting for must be a future worth fighting for – a future that looks outward and upward, not inward and downward. It's a future with a frontier where young, bright, adventurous citizens (and older ones with the same spark in their eyes) can pour their energies into creating new settlements and new products to make life better for the ones who prefer to stay at home. That's what America gave to Europe for the past several centuries. It's what the space frontier can give to America and the rest of the world in the centuries ahead.

That's the message we must tirelessly repeat to our fellow citizens and elected officials. And tirelessly is the key word here. Even assuming that the Congress goes along with the priorities and programs outlined in the Spirit of Discovery initiative in this year's NASA budget, there will be a minimum of three presidential elections, seven congressional elections and 17 NASA annual appropriations before another American sets foot on the moon – and more elections and appropriations bills before humans get to Mars.

Budget priorities can be changed and programs derailed or eliminated any time along the way. The average citizen (and the average member of Congress) will have many other higher priorities. Getting humanity out of low Earth orbit and back into deep space won't be a single appropriations battle. It will be a series of battles, and to win the war we have to win every single one of them. It will be up to each of us to see that the goal of opening up the space frontier doesn't get lost in the struggle of competing interests.

BY CLIFFORD R. McMURRAY, *NSS EXECUTIVE VICE PRESIDENT*

Space advocates also must never forget that the annual fight for the NASA budget isn't the only legislative battle. Our goal is a space frontier open to all people for commercial development, settlement, and just plain recreation. It's not a frontier closed to all but the fortunate few chosen by NASA and the other national space agencies to be government-paid explorers and scientists. In reaching for the future we want, NASA missions are only one means to a greater end. We must also be involved in the legislative battles to create a legal environment that is friendly to those commercial space enterprises that will open the door to space for the rest of us.

The most recent battle on this front concerns the passage of H.R. 3752, the Commercial Space Launch Amendments Act. This bill, which was crafted with the support of NSS and which passed by a vote of 402-1 on March 4, clarifies the certification process for suborbital rockets used for commercial purposes, including space tourism. It's the legal framework under which X-Prize entrants will gain permission from the government to fly. When the day comes that ordinary citizens like you and me can buy a ticket to space, we won't be riding in rockets with the NASA logo on their sides. It will be in spacecraft built by commercial companies like these. And so we must be sure the law allows them the freedom to fly.

H.R. 3752, which still requires Senate approval, is but one example of the non-NASA space-related bills that come before Congress each year. It's our job to make sure the good ones pass, and the bad ones never see the light of day. And to do that, we need the help of every committed space activist.

So keep those letters to Congress and letters to the editor coming (see a sampling of your efforts on page 42.) Never let a challenge to our vision go unanswered. And there's something else you can do, as well. I invite you to join us in Washington as a citizen lobbyist this July (see the ad on the facing page) at the second annual NSS Washington Legislative Conference. It's an opportunity for you to tell your Congressional leaders where you stand on the space-related issues they'll have to vote on in the coming year. They need to hear from their constituents that development of the space frontier is worth pursuing. If you don't tell them, who will?

We must be tireless warriors for our cause. Because the future we want is the future worth fighting for.



Making a Difference in Washington: **THE NSS LEGISLATIVE CONFERENCE** ***July 11-13, 2004***

What is the NSS Legislative Conference?

Space policy is made in Washington D.C. by your elected representatives. At the National Space Society Legislative Conference, we will visit the offices of your U.S. Representatives and Senators, and speak with them directly on the importance of space development and access. As citizen lobbyists, we will represent the 20,000 members of NSS, presenting specific proposals for legislation and funding that will bring the creation of a spacefaring civilization closer to reality. The greater our participation, the more seriously our representatives will take our members' concerns and recommendations.

The NSS Legislative Conference is your opportunity to actively participate in your country's government, supporting budget decisions and legislative action that affect what you really care about. This is an enjoyable and educational way to become involved in the future of our country.

What will we be doing at the Conference?

Sunday, July 11, 2004

- Policy briefings
- Training session and protocol review for Hill visits (REQUIRED for all participants)
- Review of briefing packets

Monday, July 12, 2004

- Capitol Hill and Administration speakers with Q&A opportunities
- Congressional visits

Tuesday, July 13, 2004

- Congressional visits
- Reception

How do I sign up for the Conference?

Go to www.nss.org, download the registration form, and fax or mail it to NSS Headquarters, 1620 I Street NW, Suite 615, Washington, D.C. 20006. Any questions regarding the conference should be directed to the conference chairman, Dr. Peter J. Schubert at Legislative-Conf@nss.org or call 317-843-9822.

Special room rates are available for conference participants at the Radisson Hotel Old Town Alexandria (901 N. Fairfax Estate, Alexandria, VA 22314, 703-683-6000), which will also be the location of the Sunday briefings and training session. The hotel offers free shuttle buses to the Washington area Metrorail service that provides easy access to all of the Washington area. More information is available online at www.radissonoldtown.com.

Your Views

NSS members have rallied to support the space exploration directive outlined by President Bush in January. Here are excerpts of some of your letters and commentaries.

To: Suffolk Life
From: Arthur Smith, President,
Long Island Space Society
Subject: Space – What Does it
Do For You?

Dear Editor,

Brent Marcovecchio and Christine Suarez (Point of View "Let's Deal With Problems on Earth" and letter, Feb 18, 2004) have a point: a lot of the money that goes to NASA is not spent wisely. NASA has for years been treated primarily as a jobs program for engineers and aerospace contractors in selected congressional districts. Yes, there are spectacular images to show for it all, but what does it do for you?

Space has enormous untapped potential to benefit average people, much as the Americas did 500 years ago. Do we need new renewable energy sources? Solar energy trillions of times what we use now streams past us through empty space every day. Learning to live in small, enclosed environments, such as the proposed base on the Moon, could have enormous impact on recycling and resource conservation here on Earth. New innovative companies developing reliable reusable spacecraft promise a new era of space tourism as accessible as travel on any cruise ship.

It's the 21st century in a big universe; we need to spend just a little of our effort on better figuring out our place in it.

To: *Memphis Commercial Appeal*
From: Richard McNeil, member National
Space Society
Subject: Editorials

Dear Editor,

Your running the face-to-face editorials on Friday was an interesting case for the diversity of American thought.

Unfortunately, Bill Day's editorial is wrong in several ways, but John Paschal's "Voyage to Mars is a trip we must take" is a refreshing counter balance.

To take the main issue with John Day's editorial, a funding plan that would cost only \$20 billion to get to Mars was proposed by Robert Zubrin in The Case for Mars. While this was proposed about 1997, and some upward adjustment may be called for, I would suspect that his figures would still work. This is what I call the 'PAY FOR PERFORMANCE' plan. That is, the government will pay \$20 billion to the first group that gets to Mars.

One charm of this plan is that nothing is spent unless someone gets to the Red Planet, or meets one of the milestones on the path. Another charm is that any group pursuing the goal can get there on their timetable — whether it takes 30 years, or three. This works, as the flights of SpaceShipOne by Burt Rutan's group over Mojave, Calif., is demonstrating. It's about time the ancient art of rocketry borrowed one of the great ideas from the start of aviation.

So let's go to Mars—not only for the thrill of the exploration, the national pride, but to show that private interests can make money at it!

To: *Today Show, Australia*
From: Tim McEgan, President National Space
Society of Australia
Subject: Cost of Space Exploration

Dear Today Show,

It is regrettable that the common perception

about President Bush's initiative is that it will cost too much, when in fact the opposite is true.

The main concern is, however, not the expense of the initiative, but the lack of logical context around this debate. It is very easy for Australians to hear the cost of \$15 Billion and think that is a huge expenditure. Very seldom do we hear the press report that this amount is less than 1% of the total U.S. annual budget. In fact, Americans spent double that (over \$30 Billion) on pet care last year. While pet care is not government expenditure, the context is still that American pets are more important than humans moving outward to improve our lives.

It is in our nature as humans that we easily forget the "positives" and focus on the "negatives." It is therefore very easy for us to forget that space exploration has brought about thousands of commercial products and applications that have improved our lives.

It is time to put the cost of President Bush's space exploration initiative back into context and realise (sic) that at some point we must go. His plan is equal to approximately US\$55.00 per person in the USA per year. It will be much cheaper to go now than in another hundred year's time!

To: *Salt Lake City Deseret Morning News*
From: John David Baxter, Director, National
Space Society
Subject: Costs and Benefits of Space

Dear Editor,

I saw the political cartoon, in Friday's paper, depicting the Bush Space Program as costing "to infinity and beyond!" In reality, the Bush Space Program, at maximum cost, won't be above 1% of the federal budget. Also, \$25 Billion per year, estimated for later development of the Space Program, will return to the economy \$200 Billion per year in benefits. This estimate is based on studies from the benefits from project Apollo, given by the General Accounting Office. No other federal program gives these results.

ROCKETS FOR SCHOOLS

By G.B. LEATHERWOOD

Anyone who has ever even thought about rockets and schools has to know that it's not something you just start up and do by yourself. The NSS Sheboygan Space Society knows a lot about what it really takes.

Each year, the Great Lakes Space Port Education Foundation Inc., sponsors their annual "Rockets for Schools" program, a two-day event involving school children from Wisconsin, Illinois, Indiana, Iowa and Michigan. This year Minnesota is sending teams.

The students launch rockets they have built with the help of their science teachers, make oral presentations to judges, set up and maintain

displays, and take part in all aspects of the rocket business — mission control, tracking and recovery, weather balloon launches and hearing experts tell about their experiences.

In 2003, 280 students and many adults were treated to a flyover by a U.S. Air Force B-1 Lancer bomber on Friday, a B-2 "Stealth" bomber on Saturday, and a visit by astronaut Michael Foreman. Even the cloudy and cold weather couldn't dampen the excitement during the two-day adventure. Participants are hoping for clearer skies during this year's event, scheduled for May 14 and 15.

And where does the National Space Society come in? Will Foerster, president of the Sheboygan Space Society, said, "Our project is mostly volunteer work to help set up and staff a booth with the Sheboygan Astronomical Society. We usually have a good-sized display. But the ones who really do the work are Randy and Carol Lutz. They are the ones who arrange for various groups such as the National Guard, Coast Guard, Civil Air Patrol, Boy Scouts, and other groups, to help with everything from recovery operations to air surveillance to making sure no aircraft stray into the no-fly zone and helping people find a parking space."

During last year's event, the group arranged for a Moon Suit exhibit from NASA as well as a Moon Rock display and an interesting Space Art display. Industry representatives filled exhibit

booths to excite young people about space and explain how their products and services were connected to the space program.

Astronauts, moon rocks, military units, the Civil Air Patrol, and young people launching rockets built with their own hands ... whew! As we know, one of the primary purposes of our Society is education of the public, and there is no better way to contribute to that purpose than participation in a program such as Rockets for Schools.

And what about 2004?

"We may have to cut back on some of our activities due to lack of voluntary response," says Foerster, "but Rockets for Schools will continue to be a primary project for us. We plan to have our booth again so both the student rocketeers and the hundreds of people who attend the event can see that the National Space Society is alive and well and working toward that human presence in space."

For more information about the Rockets for Schools program, you can log on to www.rockets4schools.org and find out how your chapter can participate or encourage a similar activity in your area. 📌

G. B. Leatherwood is the NSS Director of Projects Chapters. He recently moved to Florida with his wife and two dogs. He is looking forward to warm rain, green grass, but most of all news of NSS chapter projects. He can be reached by email at gbirel@bellsouth.net or proj-dir@nss.org, or by phone at (352) 686-2366 or by mail at 7213 Davenport Lane, Spring Hill, FL 34606-6348.



NSS Chapters and Projects

Learn what is going on at local chapters of the National Space Society and get the latest updates on our website:

www.nss.org/chapters.

Please send any changes to NSS headquarters at nsshq@nss.org. And remember to update us on your projects by contacting Mr. Gail Leatherwood, our Chapters Projects Director, by email at proj-dir@nss.org or gblrel@bellsouth.net, by phone at (352) 686-2366, or by mail at 7213 Davenport Lane, Spring Hill, Fla., 34606.

In every issue of the magazine, we will highlight your interesting and inspiring endeavors.

Ad Astra!

Chapter Coordinators

Vice President of Chapter Affairs:

Jim Plaxco

700 Cape Lane, Schaumburg IL 60193;
phone (847) 923-7122;
jplaxco@astrodigital.org

U.S. Chapters Coordinator:

Bennett Rutledge

4264 E. Maplewood Way, Centennial CO 80121;
phone (720) 529-8024;
rutledges@nsschapters.org

International Chapters Coordinator:

Michael James

PO Box A2078, Sydney South,
NSW 1235 Australia;
phone 61 2 9808 1429 (8 a.m. to 9 p.m.
Australian Standard Time only);
michaeljames@netspace.net.au

Region 1 Chapters:

Southern California

NSS Western Spaceport Chapter

Contact: James Spellman, Jr.
(Region 1 chapters coordinator)
4617 Oak Lane, Mtn Mesa, Lake Isabella CA
93240-9713
Phone: voice/fax (760) 379-2503
Email: wspaceport@aol.com
Online: <http://hometown.aol.com/wspaceport/Welcome.html>
Publications: Western Space Report, monthly

Orange County Space Society Chapter

Contact: Larry Evans, PO Box 53241,
Irvine CA 92619-3241
Phone: voice/fax (949) 770-0702
Online: OCspacesociety@hotmail.com
Publications: OC Space, monthly
Projects: Public displays and programs;
Student Space Congress; After School
Academy; Space Camp Southern California.

OASIS Chapter

Contact: Steve Bartlett, PO Box 1231,
Redondo Beach CA 90278
Phone: voice (562) 627-3991
Email: oasis@oasis-nss.org
Online: www.oasis-nss.org
Publications: The Odyssey, monthly
Projects: Public talks and lectures, Star parties
at Mt. Wilson Observatory; Mars Rover
Simulator; Speakers for space-related
convention panels.

Region 2 Chapters: Northern California, Washington State, Oregon

Oregon L5 Society Chapter

Contact: Bryce Walden
(Region 2 chapters coordinator) PO Box 86,
Oregon City OR 97045-0007
Phone: voice (503) 655-6189;
fax (503) 251-9901
Email: moonbase@comcast.net
Online: www.OregonL5.org
Projects: Professional papers, models, brain-
storming and idea incubator, prototyping, and
industry consulting through our Lunar Base
Research Team and Mars Instrument and
Science Team; cooperative activities with
museums and space advocacy groups; public
information tables and educational activities
including Mars rover, models and moon analog
research site; America Online Space Chat .

Golden Gate Space Frontier Society Chapter

Contact: Ned Dodds, 19 Erin Court, Pleasant
Hill CA 94523-2614
Phone: (925) 933 1721
Email: ned_dodds@yahoo.com
Projects: Volunteers for Challenger Learning
Center at Chabot Space and Science Center,
Oakland.

Chapter: Sacramento L-5 Society

Contact: Robert Compton, 3945 Grey Livery
Way, Antelope CA 95843
Phone: (916) 344-3290
Email: energycube1@cs.com
Online: www.ad6uy.com/sac-l5/index.html
Projects: Prototype water/kerosene rocket;
web site; public shopping center displays.



National Space Society

Chapter: NSS Seattle

Contact: David Stuart, 14618 21st Ave. SW, Seattle WA 98166
 Phone: (206) 324-9096 or (206) 241-6165
 Email: NSSSeattle@aol.com
 Online: <http://chapters.nss.org/wa/seattle>
 Publications: Sojourner, monthly
 Projects: Space Day displays and volunteers; NSS speakers and staffed display table at Norwescon, regional sci-fi convention

**Region 3 Chapters:
 Arizona, Oklahoma, Texas,
 New Mexico**

Region 3 chapters coordinator:
 Claire Stephens McMurray
 1206 Classen Blvd., Norman OK 73071
 Phone: (405) 329-4326
 Email: clairest@quixnet.net

Tucson L5 Space Society Chapter

Contact: Ben Nault, 8701 E. Saddleback Drive, Tucson AZ 85749
 Phone: (520) 760-2283
 Email: bnault@comcast.net
 Online: www.azstarnet.com/public/nonprofit/tucl5
 Projects: Judge space-related exhibits at regional school science fair; chapter newsletter

Phoenix Chapter of NSS

Contact: Veronica Ann Zabala-Aliberto, Arizona State University, Dept. of Geological Sciences, Planetary Geology Group, Tempe AZ 85287-1404
 Phone: (480) 965-7029
 Email: Veronica.Zabala@asu.edu
 Online: <http://groups.yahoo.com/group/NSSPHOENIXCHAPTER/>
 Publications: National Space Society of Phoenix, bimonthly

Oklahoma Space Alliance NSS Chapter

Contact: Thomas Koszoru, 514 Fenwick Court, Norman OK 73072
 Phone: (405) 366-1977
 Email: t_koszoru@cox.net
 Online: <http://members.aol.com/osanss/science>
 Publications: Outreach, Update, bimonthlies
 Projects: Host for ISDC 2004

Austin Space Frontier Society Chapter

Contact: John Strickland, 12717 Bullick Hollow Road, Austin TX 78726
 Phone: (512) 258-8998 or (512) 465-7968
 Email: jkstrick@io.com
 Projects: Revision of Boy Scouts Merit Badge Handbook on Space Exploration; space issue and briefing paper for senatorial campaign of John Cornyn of Texas; participation and papers at conventions and councils on space-related issues

Clear Lake Area NSS Chapter

Contact: Murray G. Clark, PO Box 890588, Houston TX 77289-0588
 Phone: voice (281) 367-2227;
 fax (713) 488-7903
 Email: clearlakechap@yahoo.com
 Online: www.geocities.com/clearlakechap/

NSS of North Texas Chapter

Contact: Carol Johnson, PO Box 1671, Arlington TX 76004-1671
 Phone: (972) 937-3587
 Email: pres@nssnt.org
 Online: www.nssnt.org
 Publications: The North Texas Spacecraft, monthly
 Projects: Information table and display at The Science Place, Dallas; co-authored Boy Scouts Merit Badge Handbook revision; donated World Space Week posters to schools, libraries and museum

San Antonio Space Society Chapter

Contact: Carol Redfield, 609 Ridge View Drive, San Antonio TX 78253
 Phone: voice (210) 679-7625;
 fax (210) 436-3298
 Email: credfield@stmarytx.edu
 Projects: Support for Radiance Academy West charter school the chapter helped start; support for St. Mary's University activities and Young Astronauts organization at Galm Elementary School; distribute CDs from NSS Education Committee Adopt-a-School packet.

New Mexico Space Society Chapter

Contact: Fred Aiken, PO Box 94133, Albuquerque NM 87199-4133
 Phone: (505) 856-2145
 Email: faaiken@aol.com
 Online: <http://pages.prodigy.net/leduda/nmss.htm>

**Region 4 Chapters:
 Colorado, Kansas, Missouri,
 Utah**
Heart of America Chapter NSS

Contact: George Howard
 (Region 4 chapters coordinator) PO Box 22537, Kansas City MO 64113-0537
 Phone: (816) 523-7593
 Email: KCNSH18@aol.com
 Publications: Heart of America NSS News,
 Projects: William Bent Station project, a moon/Mars base simulation

United States Air Force Academy Chapter

Contact: Kyle Vacca, PO Box 2649, US Air Force Academy CO 80841
 Phone: (719) 200-6506
 Email: co4kyle.vacca@usafa.edu
 Projects: Sponsor astronaut visits and presentations to cadets; conduct observatory nights; coordinate and conduct trips to Cheyenne Mountain, Lockheed Martin and other locations

Front Range L5 Society Chapter

Contact: Bill Nelson, 2295 Gross Circle East No. 2, Boulder CO 80302
 Phone: (303) 247-9797
 Email: billfrL5@hotmail.com

Mile High L5 Society Chapter

Contact: Mark Schloesslin, 6937 E. Briarwood Circle, Englewood CO 80112
 Phone: (303) 779-5692
 Email: mschloess@msn.com

Wichita Chapter of NSS

Contact: Dr. Randall Chambers, 2704 Winstead Circle, Wichita KS 67226-1179
 Phone: voice (316) 684-2614;
 fax (316) 684-6748
 Email: RChamb8342@aol.com
 Publications: News Digest Reports
 Projects: Educational and training programs at the Kansas Cosmosphere and Space Center; support and participate in Astra Kansas Day proclamation and celebration for governor of Kansas; evaluate and judge presentations at Wichita State College of Engineering and National Institute for Aviation Research's Engineering Open House and Banquet.

Utah Space Association Chapter

Contact: J. David Baxter, 378 I Street, Salt Lake City UT 84103
 Phone: (801) 359-0251
 Email: utahspace@aol.com
 Online: <http://members.aol.com/utahspace>
 Publications: Aurora, quarterly

**Region 5 Chapters:
 Alabama, Georgia, Kentucky,
 Tennessee**
Kentucky Chapter of NSS

Contact: Harry Reed (Region 5 chapters coordinator) 163 Harrison Road, Benton KY 42025
 Phone: (270) 527-2386
 Email: hreed@vci.net

Huntsville Alabama L5 Society Chapter

Contact: Gregory H. Allison, PMB 168, 1019 Old Monrovia Road, Huntsville AL 35806
 Phone: voice (256) 859-5538;
 fax (256) 461-3232
 Email: HAL5@hiwaay.net
 Online: <http://hiwaay.net/~hal5>
 Projects: Project HALO, including test-firings of large and small hybrid rocket motors; public lectures on space-related subjects





NSS Atlanta Chapter

Contact: Bill Gardiner, 1197 Spur 138,
Jonesboro GA 30236
Phone: voice (770) 473-7617;
fax (770) 477-0515
Email: analytech_1981@analytech.net
Online: www.nssatlanta.org
Projects: What's Up ... in Space TV program

Middle Tennessee Space Society Chapter

Contact: Chuck Schlemm, 508 Beechgrove
Way, Burns TN 37029
Phone: (615) 441-1024
Email: cschlemm@comcast.net
Projects: Space TV, an hour-long weekly program; display at Dickson Renaissance Center; educational presentations to groups of Vanderbilt University Childcare children; display tables at Cumberland Science Museum; monthly presentations during public viewing nights at the Vanderbilt Dyer Observatory

Memphis Space Society Chapter

Contact: Robert Hudson, 3861 Trufant,
Memphis TN 38128
Phone: voice (901) 388-1480;
fax (901) 566-9107
Email: midso_space@juno.com
Online: http://chapters.nss.org/tn/memphis/

Region 6 Chapters: Illinois, Ohio, Wisconsin

Region 6 chapters coordinator:
Larry Ahearn
610 West 47 Place, Chicago IL 60609
Phone: (773) 373-0349
Email: LDAhearn@aol.com

Chicago Society for Space Studies Chapter

Contact: Lawrence Boyle, PO Box 1454,
North Riverside IL 60546
Phone: voice (708) 788-1336;
fax (847) 455-6299
Email: LarryBerwy@aol.com
Online: www.astrodigital.org/csss
Projects: Cartoon History of the Space Program, planetary presentations

Chicago Space Frontier L5 Society Chapter

Contact: Bill Higgins, MS 355, Fermilab Box
500, Batavia IL 60510
Phone: (630) 393-6817
Email: Higgins@fnal.gov
Online: www.astrodigital.org/csfs

Illini Space Development Society Chapter

Contact: Mark Wallace, 314 Talbot Laboratory,
104 S. Wright St., Urbana IL 61801
Phone: (217) 244-4263
Email: isds@hotmail.com
Online: www.uiuc.edu/ro/isds

Illinois North Shore NSS Chapter

Contact: Jeffrey Liss, 1364 Edgewood Lane,
Winnetka IL 60093
Phone: voice (847) 446-8343;
fax (312) 282-7789
Email: jgljgl@aol.com

Cuyahoga Valley Space Society Chapter

Contact: George F. Cooper III, 3433 North Ave.,
Parma OH 44134
Phone: (216) 749-0017
Email: geocooper@aol.com
Publications: Cuyahoga Valley Space Society, monthly

Lunar Reclamation Society, Inc. Chapter

Contact: Peter Kokh, PO Box 2102,
Milwaukee WI 53201-2102
Phone: (414) 342-0705
Email: KokhMMM@aol.com
Online: www.lunar-reclamation.org
Publications: Moon Miners' Manifesto, monthly
Projects: Booth and exhibit at Aviation Career Day, Mitchell Field; "Rockets for Schools" annual rocket launch event

Sheboygan Space Society Chapter

Contact: Wilbert G. Foerster,
728 Center St., Kiel WI 53042-1034
Phone (920) 894-2376
Email: wilf@tcei.com CALL FOR NEW ADDRESS
Online: www.tcei.com/sss
Projects: "Rockets for Schools" display

Region 7 Chapters: Maryland, Pennsylvania, Metro-DC

Region 7 chapters coordinator:
Bennett Rutledge
4264 Maplewood Way, Centennial CO 80121
Phone: voice/fax (720) 529-8024
Email: rutledges@nsschapters.org

Baltimore Metro Chapter of NSS

Contact: Dale S. Arnold, Jr., 102 F Seevne
Court, Bel Air MD 21014
Phone: (410) 879-3602
Email: science@balticon.org
Projects: Display table at Andrews AFB air show; science programming at Maryland Regional Science Fiction Convention; judging and prize presentations at prize at Maryland Regional Science Fair; display and space backdrop at outdoor community festival

NSS North Coast Chapter

Contact: Edward C. Longnecker, 160 W. 8th
Street, Apt. 3E, Erie PA 16510-1013
Phone: (814) 459-2572
Email: nasaspaced@cs.com
Projects: Astronomy Night,
Blastoff Rocket Club

Philadelphia Area Space Alliance Chapter

Contact: Earl Bennett, PO Box 1715,
Philadelphia PA 19105
Phone: (215) 633-0878
Email: EarlBennett@erols.com
Online: http://pasa01.tripod.com
Projects: Presentations at Super Science Weekend, New Jersey State Museum, Special Awards judging at George Washington Carver Science Fair, exhibit at New Jersey State Museum in conjunction with NASA Traveling Exhibit, presentations at Philcon Science Fiction Convention

DC-L5 Chapter

Contact: Donnie Lowther, PO Box 3955,
Merrifield VA 22216-3955
Phone: (703) 354-2665
Email: DC-L5@aroundspace.com
Projects: Around Space, cable TV access program

Region 8 Chapters: New York

Region 8 chapters coordinator:
Bennett Rutledge
4264 Maplewood Way, Centennial CO 80121
Phone: voice/fax (720) 529-8024
Email: rutledges@nsschapters.org

NSS Boston Chapter

Contact: Christopher Carberry, 5 Driftwood
Road, Acton MA 01720
Phone: (617) 646-0523
Email: ccarberry@masshist.org
Online: <http://chapters.nss.org/ma>

Suffolk Challengers for Space Chapter

Contact: Prof. Reagan Lorraine Lavorata, 182
Millard Ave., West Babylon NY 11704
Phone: (631) 321-0964
Email: francoisehardy51@viola.fr and
edithpiaf51@hotmail.com
Online: www.geocities.com/francoise-hardy51/challengers.html
Projects: Aid to internet startup space firm,
educational lectures on French space program

New Frontier Society of Greater Rochester Chapter

Contact: Carl Ellsbree, 117 Kirklees Road,
Pittsford NY 14534
Phone: voice (585) 381-4218;
fax (585) 657-7244
Email: celsb@frontiernet.net
Online: <http://space.rochester.ny.us>
Publications: New Frontier Society of Greater
Rochester

Long Island Space Society Chapter

Contact: Arthur Smith, 8 Sherry Lane,
Shelden NY 11784-3901
Phone: (631) 732-1367
Email: apsmith@linspace.org
Online: www.linspace.org
Projects: Promote Space Exploration Act of
2002 and local space development authority;
Challenger Center for Space Education

New York Space Society

Contact: Candace Pankanin, 300 Gorge Road,
Cliffside Park, NJ 07010
Phone: (201) 945-0769
Email: CPankanin@aol.com
Online: www.nsschapters.org/ny/nyc
Publications: Online monthly columns
Projects: Lecture series, monthly astronomy
observations, host information table at Earth
Day at Grand Central Station

Special Interest Chapters

Space Nursing Society Chapter

Contact: Linda Plush, RN, 3053 Rancho Vista
Blvd. No. H377, Palmdale CA 93551
Phone: voice (661) 949-6780;
fax (661) 949-7292
Email: lplushsn@ix.netcom.com
Online: www.spacenursingsociety.com
Publications: Expanding Horizons, quarterly

The Odyssey Foundation Chapter

Contact: Harry K. Coffman, PO Box 18987,
Huntsville AL 35804
Phone: (404) 786-5958
Online: www.theodysseyfoundation.org

United Societies in Space Chapter

Contact: Declan J. O'Donnell, 499 Larkspur
Drive, Castle Rock CO 80104
Phone: voice (800) 632-2828;
fax (303) 663-8595
Email: djopc@qwest.net
Online: www.angelfire.com/space/usis
Publications: Space Governance Journal

International Chapters

Australia

NSS of Australia Chapter

Contact: Philip Young, GPO Box 7048,
Sydney, NSW 2001 Australia
Phone: 61 2 9614 1900
Email: nssa@nssa.com.au
Online: <http://nssa.com.au>
Publications: Space Frontier News, quarterly

Central Coast Space Frontier Society Chapter

Contact: Tony James, 98 Malison Street,
Wyoming, NSW 2250 Australia
Phone: voice 61 2 432 94748; fax 61 2 432 947 49
Email: ccfs@nssa.com.au
Online: www.nssa.com.au/ccfs
Publications: The View From Earth

Newcastle Space Frontier Society Chapter

Contact: Jack Dwyer, PO Box 1150, Newcastle,
NSW 2300 Australia
Phone: 61 496 350 37
Email: dis00005@idl.net.au
Online: www.nssa.com.au/nsfs
Publications: NSFS Newsletter

Queensland Space Frontier Chapter

Contact: Noel Jackson, PO Box 419, Nundah
Queensland 4012 Australia
Phone: 61 7 326 663 24
Email: jacksonn@uqconnect.net
Projects: Donate chapter library materials to
schools and libraries

Sydney Space Frontier Society Chapter

Contact: Wayne Short, GPO Box 7048, Sydney,
NSW 2001 Australia
Phone: 61 2 950 230 63
Email: wayne_short@optusnet.com.au

National Space of Australia Education Chapter

Contact: Jennie Young, 158 Murray Farm
Road, Beecroft, NSW 2119, Australia
Phone: 61 2 9614 1999
Email: jenniey@optushome.com.au

Perth Space Frontier Society Chapter

Contact: Kerry McLeod, PO Box 2140 Warwick,
WA 6024 Australia
Phone: 61 8 924 342 37
Email: perthsfs@iinet.net.au

Brazil

National Space Society – Brasilia Chapter

Contact: Maria B. Tome, SQN105 – Bloco G –
Apt, 104 Brasilia DF 70734-070 Brazil
Phone: voice/fax 011 5561 337
Email: bogcat@bol.com.br

Canada

Calgary Space Frontier Society Chapter

Contact: Paul Swift, 218-200 Lincoln Way,
Calgary, Alberta T3E 6K6 Canada
Phone: voice (403) 686 7430; (403) 287-3107
Email: pswift@home.com

Niagara Peninsula Space Frontier Society Chapter

Contact: Raymond Merrick, PO Box 172,
Thorold, Ontario L2V 3Y9 Canada
Phone: (905) 684-5770
Email: bessea@vaxxine.com

France

NSS France Chapter

Contact: Nicholas Turcat, 6 Clos Perault,
Athis-Mons 91200 France
Phone: voice 336 88 56 2747;
fax 331 69 38 8656
Email: nssfrance@hotmail.com
Online: <http://www.nssfrance.fr/st/> and
<http://www.nssfrance.com>

Germany

Deutsche Raumfahrtgesellschaft e.V. Chapter

Contact: Michael Stennecken, Greta-
Buenichmann-Str. 3, 48155 Muenster Germany
Phone: voice 49 251 394 4863;
fax 49 251 394 4864
Email: info@drg-gss.org
Online: www.drg-gss.org
Publications: Raumfahrt Concret

Ireland

Chapter: NSS Ireland

Contact: Alan Kelly, PO Box 6896,
Dublin 2 Ireland
Phone: 353 1 8722 20425
Email: Amon@vnl.com

Mexico

Sociedad Espacial Mexicana, A.C. Chapter

Contact: Jesus Raygoza B., Apartado Postal
5-75, Guadalajara Jalisc 45042 Mexico
Phone: 52 3 647 5710
Email: semspaceorg@starmedia.com
Publications: XAMAN-EK, quarterly and
semiannually



SETTING THE STAGE FOR A NEW REACH IN SPACE

BY BRIAN E. CHASE AND GEORGE T. WHITESIDES, NSS EXECUTIVE DIRECTOR

The first thing you'll notice about this column is two names and two pictures instead of just one. Why's that? Brian Chase has accepted a position with The Space Foundation as the vice president of their new Washington, D.C., office, and George Whitesides has just joined NSS as the new executive director.

George is moving from Los Angeles, where he founded and ran several space advocacy and educational projects. George has jumped in with both feet, beginning his month with interviews on NBC, the Associated Press and Space.com, advocating NSS' vision of vigorous space exploration and settlement. He also is looking forward to making even stronger connections between our members and new space ventures—the space tourism, transportation and entertainment companies that will change the way we think about space.

As you may recall in Executive Committee Chairman Greg Allison's column last month, NSS has moved to a great strategic location in downtown Washington—just two blocks north of the White House—and hired a professional management company to improve the administrative operations of the society. The Space Foundation has rented space for its new operation in the same office suite, which means our offices are literally next door to each other.

In the near term, what that means for NSS is a smooth transition between executive directors. But in the long term it means greater opportunities for partnerships and coordinated efforts between our organizations. Additionally, the new National Space and Satellite Alliance, of which the NSS and Space Foundation are founding partners—also is housed in the same office, so together these organizations can have a critical impact on space policy.

And that impact can't come too soon. The new vision for space exploration faces many challenges in Washington, including the fact that it's an election year and many members of

Congress are concerned about increased federal spending. We know as well as you that this vision is not going to break the bank—NASA represents just 0.7 percent of federal spending—and it's an investment we must make

for the future of our nation and society. But not everyone understands that, so it is up to us—both as NSS and in partnership with other organizations—to ensure our vision for the exploration, development and settlement of space.

We also have to continue focusing on the regulatory and commercial side of the space sector. Although the new vision and discussion of the moon and Mars is garnering most of the attention right now, the U.S. House recently passed H.R. 3752, the Commercial Space Launch Amendments Act of 2004. This little-noticed piece of legislation will put in place a clear, balanced regulatory regime to promote the emerging suborbital launch industry while ensuring public safety. Given the tremendous potential of this industry, we need to work to pass similar legislation in the Senate and then get it enacted into law. NSS worked closely with a coalition of organizations, including the X-Prize Foundation, Aerospace States Association, the Space Access Society, ProSpace, and the Space Frontier Foundation, as well as the suborbital industry, to raise the profile of this issue, and we need to continue doing so.

So while this may mark a change in the name and face associated with NSS, it doesn't change our mission or our direction. Indeed, in many ways we have the chance to be stronger and more vital than ever. Ad Astra! 🚀



Brian E. Chase



George T. Whitesides

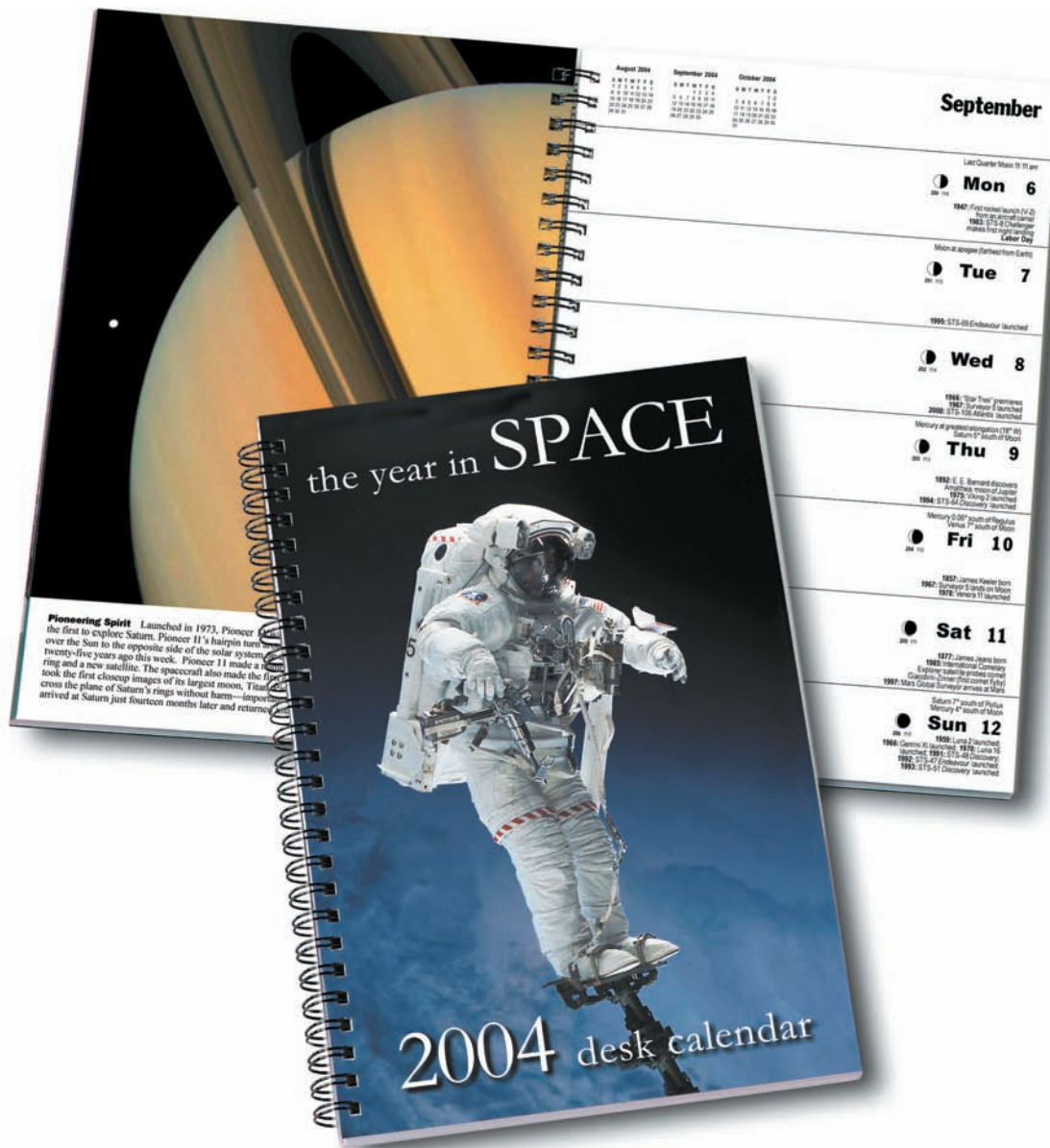
CREATING A LASTING LEGACY

If you look back 500 years, few events stand out as truly important. A few pieces of great artwork, religious reforms, perhaps certain battles. Topping the list, though, is a discovery every child can recite, an event that shaped the entire world as we know it today—the voyage of Christopher Columbus and the explorations of a new world.

We are embarking on a similar journey, one that again will reshape the course of humanity. You have an opportunity to help bring it about as part of the lasting legacy we at the National Space Society are building, together with the world space community. Your vision of a future for all humanity, spread beyond these bounds of Earth, can be realized as testament to your courage and ability to imagine the possible.

If this is a legacy you wish to share with us, please consider remembering the National Space Society in your will, or through a planned gift. For more information on making a bequest or gift to NSS, please contact our executive director at (202) 429-1600.

Ad Astra!



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P R I Z E

NSS Salutes the X PRIZE

NSS is proud to be one of the early supporters of the X PRIZE Competition, publishing Dr. Peter Diamandis' article on the concept in the pages of *Ad Astra* in 1995. Now on the verge of the winning X PRIZE flight we are excited to watch as a new generation of spaceships are ushered into existence—ships built specifically to take the public into space. We urge our members to visit www.xprize.org to learn more about the competition, contribute to the X PRIZE Foundation's efforts and learn how you can personally attend future X PRIZE launches!

"NSS was the first place I turned to discuss the X PRIZE in a public forum," said X PRIZE Chairman Peter Diamandis. "The National Space Society was founded on the dream of spaceflight for everyone."

National Space Society
1620 I Street, NW, Suite 615
Washington DC 20006
Tel: 202-429-1600
Fax: 202-463-8498

