

## FROM THE CHIEF HISTORIAN



With the publication of a history of the Galileo project, the selection of authors for histories of deep space navigation (Andrew Butrica) and Cassini (to be announced shortly), the forthcoming publication of Doug Mudgway's biography of William Pickering, and a major program jointly sponsored by the Science Mission Directorate and the History Division, we are well on our way to filling a huge gap in National Aeronautics and Space Administration (NASA) history: the history of the Earth and space sciences.

As a further step in this direction I have recently been discussing space science history in my Why We Explore series. The latest one, on Galileo, follows. Other essays in the series may be found at [http://www.nasa.gov/mission\\_pages/exploration/whyweexploreindex.html](http://www.nasa.gov/mission_pages/exploration/whyweexploreindex.html).

The publication in the NASA History Series of Michael Meltzer's *Mission to Jupiter: A History of the Galileo Project* details another extraordinary voyage of exploration and highlights the trials, tribulations, and triumphs in the long process required for success in planetary science. The Galileo spacecraft was launched on 18 October 1989, arrived at Jupiter on 7 December 1995, and undertook its tour of Jupiter over the next two years. This Prime Mission would have been quite enough to declare success, but it was followed by the Galileo Europa Mission, which extended the spacecraft's tour for two more years, until December 1999. During this time, the spacecraft studied not only Europa, but also other Jovian satellites, especially (and appropriately) the other "Galilean satellites"

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## Preview of *William H. Pickering: America's Deep Space Pioneer*

NASA SP-2007-4113

by Douglas J. Mudgway, NASA JPL (Retired)

### Introduction

On the first day of February 1958, three men at the focus of an early-morning press conference in Washington, DC, held aloft a model of Explorer 1, America's first Earth satellite, for the press photographers. In the public euphoria that followed the successful launch of Explorer 1, that image of William Pickering, Wernher von Braun, and James Van Allen became an icon for America's response to the challenge for preeminence in space engendered by the Soviet Sputnik three months earlier, as well as a symbol for the dawn of the age of space.

The careers of von Braun and Van Allen have been covered elsewhere. This book presents a personal view of the life and times of William H. Pickering.



Pickering, von Braun, and Van Allen show Explorer 1 to the world on 1 February 1958. (GRIN Image GPN-2000-000478)

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*Preview of William H. Pickering: America's Deep Space Pioneer (continued)*

William Pickering was the Director of NASA's renowned Jet Propulsion Laboratory in Pasadena, California, from 1954 until he retired in 1976; he was recognized nationally and internationally for his significant contributions to the beginning of the Space Age and for the first robotic explorations of the Moon, Venus, and Mars.

### **Origin and Education**

William Pickering was born in New Zealand in 1910 and received his primary and secondary school education there. Early in life, he developed an intense interest in science and technology—particularly the then-new technology of radio communication. He decided to become an electrical engineer and began a course in electrical engineering at the University of New Zealand.

In 1928, a fortuitous family connection brought him to California, where he continued his electrical engineering studies at the then-new California Institute of Technology and quickly established himself as an outstanding student. A brilliant college career soon followed.

By 1936, he had earned a Ph.D. (cum laude) in physics and become a member of the Caltech faculty. In 1944, he became a professor of electrical engineering.

### **Cosmic-Ray Research**

At Caltech, Pickering worked under the famous physicist Robert Millikan as a researcher on cosmic-ray experiments, a relatively new field of physics at the time. He developed new electronic techniques for returning cosmic-ray data from high-altitude balloons to Earth. As part of Millikan's team, he carried out extensive observations in India, Canada, and Mexico searching for the "latitude effect" in cosmic-ray intensity at high altitudes.

A succession of papers published in *Physical Review*, *Review of Scientific Instruments*, and *Reviews of Modern Physics* reflect his work in this period.

### **Guided Missile Development**

During World War II, Pickering served as an electrical engineering instructor for the United States Navy at Caltech but in 1944, when Caltech's Jet Propulsion Laboratory (JPL) was developing rocket propulsion systems for the U.S. Army, Pickering joined the workforce as a technical manager. He quickly established himself as an outstanding leader, and in 1954, at the height of the Cold War with the USSR, Caltech named him Director of JPL.

As Director of JPL, Pickering oversaw the development and testing of the U.S. Army's first two Intermediate Range Ballistic Missile weapon systems, the Corporal and Sergeant.

And then, suddenly, the world changed. In October 1957, the first Soviet Sputnik startled the world with its blatant demonstration of Soviet supremacy in space. The United States was outraged and demanded a powerful response.

Pickering led the JPL effort, which, together with teams led by von Braun and Van Allen, promptly set about answering the Soviet challenge. Eighty days later, on 31 January 1958, America's first satellite roared into Earth orbit. It was named Explorer 1 and marked the beginning of the Space Age. Pickering, von Braun, and Van Allen became instant heroes and the darlings of the media throughout the free world.

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discovered by Galileo almost 400 years before. Aside from satellites, the Galileo spacecraft also studied the magnetic fields, particles, and atmosphere of Jupiter itself, notably with its releasable Atmospheric Probe. Even then, Galileo's explorations were not over; its lifetime was further extended by the Galileo Millennium Mission, which ran from January 2000 through the end of mission operations in January 2003. Galileo's destruction occurred by design when it was sent on a collision course with Jupiter on 21 September 2003 and burned up in Jupiter's dense atmosphere.

Galileo represented a new phase in the study of the outer planets. The Pioneer probes and Voyagers 1 and 2 together completed the preliminary reconnaissance of those gas giants. But Galileo undertook a much more systematic, in-depth, and holistic analysis of the entire Jupiter system, featuring close flybys of its satellites and intense study of its particles and fields. And even before the spacecraft reached Jupiter, it visited Venus and two asteroids, and it twice returned to Earth, observing a spectacular celestial crash along the way.



The Space Shuttle *Atlantis*, carrying the Galileo orbiter and atmospheric probe, lifts off from Kennedy Space Center on 18 October 1989. ([http://solarsystem.nasa.gov/multimedia/display.cfm?IM\\_ID=2057](http://solarsystem.nasa.gov/multimedia/display.cfm?IM_ID=2057))

Like many spacecraft, Galileo had an extended and painful birth. The total mission, from launch to destruction, lasted 14 years, but the "Jupiter Orbiter Probe" project from which it emerged had begun another 14 years before launch. Funding was won from Congress in 1977, and the project was renamed Galileo the following year. The spacecraft was originally scheduled to be deployed in 1984 aboard the Space Shuttle, which would not fly its first mission until April 1981. Once deployed in Earth orbit, the plan was for it to be launched by a Centaur upper stage toward Jupiter. Meanwhile, in the early 1980s, the ever-watchful Office of Management and Budget proposed not only that Galileo should be canceled, but that planetary exploration should be halted and the Jet Propulsion Laboratory (JPL) shut down. All three made it through that crisis, and in December 1985, the spacecraft was transported to Kennedy Space Center for launch on Space Shuttle *Atlantis*.

The following month, in one of NASA's tragic and memorable moments, the Space Shuttle *Challenger* and its entire crew were lost at launch. The Shuttle program's return to flight would take almost three years. During that time, it was decided that the liquid-hydrogen-fueled Centaur was too dangerous to take aboard the Shuttle and that a solid-fueled Inertial Upper Stage (IUS) would be used instead. Because of the lower thrust of the IUS, and in order to minimize fuel consumption, Venus and two Earth gravity-assists (affectionately termed VEEGA) replaced the direct trajectory, greatly lengthening the travel time to Jupiter.

Like its birth, Galileo's journey was full of drama—as full as any of the ocean voyages in the Age of Discovery. Four months after launch, it reached Venus for the first gravity-assist. By December 1990, the spacecraft had returned to Earth for another gravity-assist. Several months later, the mission encountered a major problem: now that it was far enough from the Sun, mission controllers attempted to deploy its

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high-gain antenna, but to no avail. That meant data return would be severely limited. Engineers were forced to use the low-gain antenna, analogous to using a dim lightbulb in place of a powerful searchlight. Nevertheless, in due course and with a great deal of patience and ingenuity, 70 percent of the mission's scientific goals were completed. In the midst of this problem, the spacecraft proceeded to the asteroid belt, where Galileo encountered Gasptra on 29 October 1991, capturing spectacular images. A year later it was back to Earth for its second Earth gravity-assist.

On 28 August 1993, Galileo was in the asteroid belt again, encountering Ida at a distance of only 1,500 miles. Among other surprises, images examined months later revealed a moon of Ida, later named Dactyl. Finally, Jupiter was in Galileo's sights, but meanwhile, unprecedented events were unfolding at Galileo's final destination. Comet Shoemaker-Levy 9 had broken up, and from 16 to 29 July 1994, 21 pieces of the comet collided with Jupiter, giving it a spectacular series of "black eyes." Still 140 million miles from Jupiter, Galileo captured images nonetheless,

even as most telescopes on (and orbiting) Earth were trained on the event from their much more distant vantage point. At the U.S. Naval Observatory, where I was working at the time, I recall our astonishment that we could see the dark splotches on Jupiter, even with small telescopes and from the middle of Washington, DC. A year later, at a distance of 39 million miles from Jupiter, Galileo survived the most intense interplanetary dust storm ever recorded. At about this time, with 147 days to go before arrival at Jupiter, the Jupiter Atmospheric Probe separated from Galileo and headed toward its destination in freefall.

By the time Galileo finally arrived at the Jupiter system in December 1995, the comet impact sites had dissipated. But the spacecraft had plenty to observe. On the day of arrival, the Atmospheric Probe plunged into Jupiter, slowed by drogue parachutes, while Galileo flew by Europa and Io. The spacecraft then settled down to its Prime Mission Orbiter tour, which consisted of 11 orbits of Jupiter. They were not normal orbits, but orbits that unfolded in a flower-petal pattern while maximizing scientific visits to the Jovian moons. Thus, the first orbit lasted 7 months, culminating in a close encounter with Ganymede. Galileo visited Ganymede, Callisto, and Europa multiple times over the next two years as part of the Prime Mission.

During the extended Galileo Europa Mission,

the spacecraft also visited Io and mapped its cloud of charged particles and the density of sulfur streaming from Io's erupting volcanoes.



In the Vertical Processing Facility (VPF), the spacecraft Galileo is prepared for mating with the Inertial Upper Stage booster. Galileo was launched aboard the orbiter *Atlantis* on Space Shuttle mission STS-34, 12 October 1989, and sent to the planet Jupiter on a journey that took more than six years to complete. (GRIN Image GPN-2000-000672)

Further observations of Io and Jovian system dynamics were made during the Millennium Mission extension, including the eruptions of Io's Loki volcano, the largest and most powerful in the solar system. Europa proved no less fascinating, with its water-ice surface and large ocean lurking beneath. And the Atmospheric Probe results proved revolutionary. As Meltzer puts it, Probe data "made it necessary for scientists to revisit many of their beliefs about the formation and evolution of our solar system's giant gaseous planets. Measurements of atmospheric composition, wind velocities, temperatures, cloud characteristics, electrical storms and elemental and molecular abundances painted a very different picture of Jupiter from what was expected." Galileo found a turbulent Jovian atmosphere, complete with lightning and thunderstorms a thousand times the size of those on Earth. Distinct from the Pioneer and Voyager planetary flyby missions, Galileo was the first to orbit the giant planet and completed a total of 34 orbits by the end of its mission in 2003.

Meltzer also makes clear how complex spacecraft development has become, not only in terms of institutions and technology, but also in terms of highly trained individuals interacting at many levels. The lead NASA Field Center for the project was the Jet Propulsion Laboratory in Pasadena, California, with oversight from the Solar System Exploration Division at NASA Headquarters in Washington. NASA's Ames Research Center developed the Jupiter probe that entered the planet's atmosphere. NASA's Lewis Research Center (now Glenn) in Cleveland helped design the spacecraft propulsion system and integrate the payload with the Shuttle. The Shuttle itself, as well as the astronauts, was under the jurisdiction of Johnson Space Center in Texas, while Kennedy Space Center provided the launch facilities. The Department of Energy provided the controversial plutonium-powered electrical generators for the spacecraft. Finally, the Galileo project involved international cooperation with the Federal Republic of Germany, which provided instrumentation, propulsion for the orbiter, and additional telemetry from the German Space Operations Center.

Galileo the man would have marveled at Galileo the machine. And we should marvel, too, at what we can do and see in the new Age of Discovery.

#### **Further Reading**

Meltzer, Michael. *Mission to Jupiter: A History of the Galileo Project* (Washington, DC: NASA SP-2007-4231, 2003). Available for purchase from the NASA Center for Aerospace Information, 301-621-0390, or online at <https://www.sti.nasa.gov/cgi-bin/ordersti.pl>. This book is also available online at <http://history.nasa.gov/lsp4231.pdf>.

Steve Dick

*Preview of William H. Pickering: America's Deep Space Pioneer (continued)***Deep Space Exploration**

A few months later, in October 1958, NASA was established. JPL severed its connection to the Army and, while retaining its affiliation with Caltech, became a private contractor to NASA. Under the direction of NASA, and with Pickering's leadership, JPL carried out NASA's ambitious program for the exploration of the solar system, Moon, and planets.

Within its first decade, JPL-built spacecraft sent back the first close-up photographs of the lunar surface, while others journeyed far beyond the Moon to examine Venus. Later still, others returned the first close-up views of the surface of Mars.

Later in Pickering's tenure at JPL, NASA's programs called for even more complex space missions to carry out soft-landings on the Moon and on Mars.

In all, during the period of Pickering's directorship of the laboratory, JPL designed and conducted 16 lunar missions using Ranger and Surveyor spacecraft and 10 missions to Venus and Mars using Mariner spacecraft. All were high-risk missions, and not all were successful, but three Ranger missions, five Surveyors, and seven Mariner missions succeeded in achieving their full mission objectives.

Pickering was an eloquent proponent of NASA's Apollo program in its early years, but he later came to criticize the diversion of funds to the manned program at the expense of unmanned exploration using robotic spacecraft.

**Technology Transfer**

In the late 1960s, Pickering became interested in transferring space-age technology to the solution of prevalent problems in the civil sector. This was driven, in part, by his need to find viable alternatives for JPL's unique technical resources in light of the dwindling congressional support for major robotic space projects.

As a result of these efforts, many new, non-space-related projects ran in parallel with the ongoing NASA programs at JPL. These projects were funded, with NASA concurrence, by independent agencies. Projects in the fields of urban mass transportation, city government, education, law enforcement, and biomedics and solar energy are examples.



William H. Pickering receives the 1975 National Medal of Science from President Gerald R. Ford on 18 October 1976. (Presidential Library Photo B1907-17)

Although he saw some viable results, particularly in the medical field, Pickering was disillusioned by his overall experience with technology transfer as a successful enterprise for JPL.

### **Management Approach**

Throughout his tenure as Director, Pickering's relaxed, university-like management style came into constant conflict with the more rigid, civil service-like mode of management demanded by NASA for its time-sensitive programs.

In the end, though, and despite initially turbulent beginnings, Pickering forged an enduring and remarkably productive relationship between JPL and NASA. As Associate Administrator Homer Newell said, "Men of goodwill made it work."

### **Pickering in Public**

As the director of a world-class establishment constantly in the media spotlight, Pickering became the voice, and the face, of JPL. In hundreds of speeches and articles, delivered both in the United States and internationally, Pickering gave voice to his vision for space, society, and education.

His strong and widely disseminated advocacy for the space program and its benefits to humanity brought him an enormous amount of public recognition. Throughout his career, William Pickering received many prestigious honors from military, civilian, and academic organizations around the world. He was also a member of the National Academies of the Sciences and Engineering and very active in the American Institute of Aeronautics and Astronautics (AIAA).

### **Business Enterprise**

Pickering retired as Director of JPL in 1976, and for several years thereafter, he assisted the government of Saudi Arabia in establishing an institute of advanced technology in that country. In later years, his concern for environmental issues led to the founding of a small company to manufacture wood pellets for domestic heating stoves, using pressure-treated sawdust.

### **Return to His Roots**

Despite the fact that he built his career and reputation in the United States, William Pickering never lost touch with his New Zealand roots, and he made many highly publicized return visits.

His sudden death in March 2004 was widely reported in United States and overseas. He was 93.

Speaking at William Pickering's memorial service, a NASA official said, "His pioneering work formed the foundation upon which the current program for exploring our solar system was built."

The Director of JPL described him as "one of the titans of our nation's space program."

He was indeed.

## NEWS FROM HEADQUARTERS AND THE CENTERS

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### Headquarters

Nadine Andreassen worked on logistics for the upcoming conference on the 50th anniversary of the Space Age, to be held in Washington, DC, 22–23 October 2007, in conjunction with the 50th anniversary meeting of the Society for the History of Technology (SHOT).

Colin Fries and John Hargenrader continue the ongoing task of scanning and adding the *Current News* collection to the database. Colin recently completed work on news articles from 2000 through 2002. John is currently scanning *NASA Current News* for 1991 through 1997 and is filling in gaps in our collection by scanning issues of *Current News* borrowed from the Headquarters Library. Colin and John also continue to work jointly to process a large, 40-cubic-foot collection of NACA material. Colin is processing the subject files and John the biographical files. John and Colin also share reference duties such as answering inquiries sent to the public e-mail account on the History Division Web site and assisting walk-in researchers. Additionally, they fact-checked several items for our office and Public Affairs, including captions for several chapters of a forthcoming NASA 50th anniversary publication, a Defining Events chronology, and an appendix to the 2005 *Aeronautics and Space Report of the President*.

Colin revised the NASA History Organizational Charts Web page by providing PDFs and editing hyperlinks. In April, Colin attended the annual NASA History Program Review meeting at Dryden Flight Research Center, and in June, he attended a two-day National Archives–sponsored workshop on “Disaster Preparedness and Response” in Baltimore, Maryland.

John is nearing completion of the preservation photocopying of all the old newspaper clippings in the human spaceflight files.

We welcome Elizabeth Suckow, who joined the NASA Headquarters History Division as a contract archivist at the end of May. She was previously employed as an archives technician at History Associates, Inc., in Maryland. Liz obtained a master’s degree in 20th-century American history and public history at American University and a bachelor’s degree in American history at Wisconsin Lutheran College (Milwaukee, Wisconsin).

Liz appraised 13 cubic feet of Code Z, Office of Policy and Plans, files and copied numerous items for inclusion in the Historical Reference Collection. She is preparing the official files for transfer to the National Archives and is describing in the database the chronological files that will be retained in our office. Liz also has assisted in answering a few reference requests.

Steve Garber completed his participation on a Source Evaluation Board team that helped select a new graphics contractor for NASA Headquarters. Now he is enjoying

working with the new contractor team, Media Fusion and SAIC, which started in May. Steve also is very glad to have Abe Gibson, our summer intern, aboard.

Abraham Gibson, a master's student in history from Virginia Tech, is working as a part-time summer intern in the NASA History Division. He has quickly come up to speed and helped out on a variety of publications and other projects.

Jane Odom continues to acquire and appraise new material for the Historical Reference Collection. The latest additions include microgravity and life sciences chronological correspondence files; external relations chronological files, books, and reports; and a collection of memos detailing technical observations on the Shuttle and Station. Jane appraised several cubic feet of material on Shuttle-*Mir*, as well as material donated by the Office of External Relations and the Office of Institutions and Management. She continues to answer reference requests and facilitates the entry of our international visitors into the building. An intern is working under her direction to describe former Administrator James Fletcher's chronological correspondence files from the early 1970s. Jane is working with the information technology (IT) staff on a database change that will allow selected PDFs in the database to be published to an external Web site accessible to all.

## Ames Research Center (ARC)

San Jose State University (SJSU) honored April Gage, archivist with the NASA Ames History Office. April's Master of Library and Information Science (MLIS) thesis, an oral history of the Freedom to Read Foundation, was named the outstanding thesis university-wide at the 2007 SJSU graduation ceremonies. The SJSU School of Library and Information Science is the largest accredited program in the country. April has recently been busy curating an influx of artifacts uprooted by the continuing movement of offices around Ames.

Steve Adrian, an intern from the MLIS program at San Jose State University, completed the processing and a finding aid for the Alvin Seiff papers. Seiff and his work on atmospheric probes will be honored this summer with the first award of the Alvin Seiff Memorial Award by the International Planetary Probe Workshop.

Chris Grech of the Monterey Bay Aquarium Research Institute and Stephen Rock of the Stanford University Aeronautics Department lectured at Ames on 31 January about the expedition to the debris field of the USS *Macon*, once stationed at Moffett Field, and about the remotely operated vehicle used in the expedition.

Jack Boyd and Glenn Bugos are preparing two papers for presentation at the "Space 2007" conference of the American Institute of Aeronautics and Astronautics. "What is a NACA-Style Organization?" grew out of a discussion held through the Space Portal at NASA Ames; other topics included how the National Advisory Committee for Aeronautics (NACA) might serve as a model for their efforts to lend organizational and research support to the entrepreneurial space community. "Robotic Lunar Precursors to Apollo" will explore the Ranger, Surveyor, and Lunar Orbiter series of spacecraft and how, even though designed for scientific explorations of the Moon, they generated valuable engineering data to support the engineering of Apollo.

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*News from Headquarters and the Centers (continued)*

## Dryden Flight Research Center (DFRC)

Curtis Peebles's manuscript on the lessons learned from the X-43 program has cleared the export control reviewers and is on the next step toward publication. He has drafted an article to appear in the *International Test and Evaluation Journal* on satellite reconnaissance and the stabilization of the Cold War. In addition, he has begun work on a paper about the role of the aerospace industry in the growth of the Antelope Valley, a portion of the Mojave Desert that includes Rogers Dry Lake, site of Edwards Air Force Base and the NASA Hugh L. Dryden Flight Research Center. Later this fall, he is to present the paper at a conference sponsored jointly by the University of Southern California and the Huntington Library.

Peter Merlin has just completed his monograph on the design and development of the family of aircraft known as the Blackbirds, as well as the lessons learned from that process. The manuscript is now undergoing its own review for export control. He will now have a chance to focus on the archives again, until his next project is more narrowly defined.

Christian Gelzer has spent time working with classes of NASA Explorer School teachers during their initial training and induction into the program. He has begun the preliminary work on a history of the Center's Flight Loads Laboratory, which he expects will develop into a monograph. Dryden's Loads Lab played key roles in determining structural and thermodynamic loads sustained by aircraft flying at increasingly higher altitudes and speeds, beginning with the X-15. It was the capacity for testing thermal loads that set the lab apart from the few other loads labs in existence when it was first established, and the lab has expanded its capabilities to include nondestructive testing of composite materials commonly used on, and as major components of, aircraft. When he finds time, he continues work on his truck fairings monograph.

All three members of the history office were called upon as support personnel to the Outreach and Public Affairs office when the Space Shuttle *Atlantis* concluded STS-117 at Dryden in June, as well as for the debut of the Stratospheric Observatory for Infrared Astronomy (SOFIA) Boeing 747 a mere six days later.

## Glenn Research Center (GRC)

Archivist Bob Arrighi (of RSIS) is working on the production of a number of materials capturing the history of the Altitude Wind Tunnel. Currently, a monograph, a short documentary, and a multimedia CD-ROM have been approved by Glenn Historic Preservation Officer, Les Main. Two interactive Web sites are also in the works for the Altitude Wind Tunnel. Bob will also be attending the "Cultural Resource Management" workshop at Glenn in August.

Archivist Nora Blackman (RSIS) continues to ready the collection for our move into new quarters in late 2007. Work on a large collection of Wind Energy Program Office materials donated by retiree David Spera will be the focus of the remainder of this year's processing projects. In July, Nora addressed the issue of reappraisal of material in the archives as a panel speaker at the National Association of Archivists and Records Managers annual conference in Kansas City, Missouri. She also attended a workshop on vital records and several conference sessions on managing electronic records.

A greater understanding of the Center's post-World War II land acquisitions was gained during Arrighi's visit with Bob Boone and his guests in June. Mr. Boone's father, a wealthy local publisher, developed the farm that bore the family name from 1935 to 1951. Boone Farm was notable for its manor house, in-ground swimming pool, tennis courts, and riding stables. Bob and his childhood friend Gene Norris recounted tales of air races overhead, NACA property negotiations, and the general development of the area from farm land to federal laboratory in the late 1940s and early 1950s. The Boone Farm was purchased by the Guerin family in 1951 and then sold to the Center in 1957. Today it is known as "The Guerin House" and serves as an informal conference center.

## Johnson Space Center (JSC)

Last fall, when talking with a former longtime JSC employee, the Johnson Space Center History Office learned about a series of Public Affairs Office (PAO) files that documented the Gemini, Apollo, and Skylab missions. These series included original transcripts from press conferences and briefings, change of shift briefings, technical briefings, and other related events that spanned from the beginning to the end of each mission during those time periods. After a number of phone calls and e-mail inquiries, their search led them to the PAO Vault housed in Building 2, which was about to be vacated due to the building's refurbishment.

Knowing that the contents of the entire vault would be boxed and inaccessible for an unspecified time, the History Office talked to PAO and offered to pack up the collection of transcript folders, as well as a number of other selected materials, and agreed to prepare these documents for electronic conversion and future preservation. JSC Archivist Mark Scroggins had the 16 large boxes of documents transferred to Building 412, the JSC Archives Repository, to wait for processing.

The History Office requested and received two college students to work as history research interns for the summer. The history staff compiled instructions for the students and trained them to prepare the documents for conversion and future historic preservation. The students also conducted a series of electronic searches to ensure that the materials had not been previously scanned. After the conversion has been completed, the materials will be returned to and housed in Building 412 until the PAO Vault reopens. The History Office and JSC Archivist will be reviewing the electronic contents to recommend sections to be added to the JSC History Portal for Web access.

The JSC History Office team continues to interview individuals for the NASA at 50 Oral History Project, sponsored by the NASA Headquarters History Office, and for the NASA JSC Oral History Project. They are also assisting with a project to collect information through oral history for a proposed book reflecting on the accomplishments of the Space Shuttle Program.

The History Office at the NASA Johnson Space Center received a unique honor earlier this year when Rebecca Wright, History Coordinator, was awarded the Silver Snoopy. During a surprise ceremony held at the Houston Center, astronaut Barbara Morgan expressed appreciation for Wright's outstanding support of the space program through her work with the JSC History Office and the Oral History Project.

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*News from Headquarters and the Centers (continued)*

The Silver Snoopy is a NASA Space Flight Awareness (SFA) award personally presented by a member of the astronaut corps since it represents the astronauts' own recognition of excellence. In keeping with the tradition of presenting the award as a surprise, Morgan and a contingent of Rebecca's coworkers, colleagues, and family members interrupted a meeting to make this presentation.

In her remarks, Morgan said, "Your commitment to NASA and your tireless efforts to record and preserve the accomplishments and the spirit of the Agency have earned you the respect, admiration, and gratitude of your colleagues at virtually every Center and every office you have visited in your pursuits.

"As a driving force behind JSC and Headquarters Oral History Projects, you have captured for posterity the knowledge, wisdom, anecdotes, and witticisms of the leaders of America's space programs from the days of NACA through the tragedy of *Columbia* and the Return to Flight. In addition to far-ranging technical understanding, your illumination of the human side of spaceflight—so inspiring but so difficult to capture in traditional texts—has produced a priceless treasure trove of information that will be mined by scholars, engineers, and budding astronauts for generations to come," she said.

She also added that the award is a "testimony to your expertise and skill that you and the members of your team are recognized throughout the Agency for the quality of the work that you do," providing the opportunity for Rebecca to recognize her two team members, Sandra Johnson and Jennifer Ross-Nazzal, for their significant contributions to NASA's history program.

Also participating in the award presentation was Duane Ross, Head of the Astronaut Selection Office, who was instrumental in the implementation of the JSC Oral History Project and has served as a senior adviser to the History Office staff for more than 10 years.

During the ceremony, Morgan took the opportunity to share with those attending the history of the Silver Snoopy Award and explained that the pin being awarded had been aboard STS-103 during its mission from 19 to 27 December 1999, allowing "this Snoopy to log 3.25 million miles in space." Along with the pin, Wright received a letter of commendation and a signed certificate.

Rebecca Wright began leading the JSC Oral History Project soon after it was created, and the continual efforts from this project have resulted in more than 1,150 hours of audio recordings from 550 individuals. The project, ongoing since mid-1996, gathers at least 30 new interviews a year and posts the transcripts to the Center's History Portal (<http://www.jsc.nasa.gov/history>). Other projects conducted



Rebecca Wright (center), History Coordinator at Johnson Space Center, received the Silver Snoopy Award during a surprise ceremony in Houston. Presenting the award were astronaut Barbara Morgan (left), Educator Astronaut and mission specialist for STS-118, and Duane Ross, who has served as a senior adviser to the JSC History Office for more than a decade.

by the team have included those for the history of Shuttle-*Mir* and the *Columbia* Recovery Project. Also, for the NASA Headquarters History Office, projects include HerStory, NACA, NASA Administrators, Aviatix Pioneers, and their current project of collecting information for the NASA at 50 Oral History Project in commemoration of the space agency's golden anniversary.

In December 2004, Wright became the JSC History Coordinator when the responsibilities of the History Office were assumed by the Oral History Project team. While continuing with the oral history efforts, the three-person staff also provides answers to reference and research issues; assists in reviewing documents containing historical information; conducts outreach events; and works closely with the archivists at JSC, NASA Headquarters, and the University of Houston-Clear Lake, where the JSC History Collection and the audio recordings from the oral history projects are housed.

## Langley Research Center (LaRC)

Two history students in the 2007 Langley Aerospace Research Summer Scholars (LARSS) program are working at Langley for the summer. Laura Freeze, a student at Old Dominion University in Norfolk, Virginia, is sponsored by the Aeronautics Research Mission Directorate. She is archiving the papers of Mr. Jim A. Penland. Mr. Penland was a member of the NACA design and wind tunnel testing team for the X-15. In addition to archiving his papers, Laura is recording and transcribing conversations with Mr. Penland about his X-15 work.

Lynne Fors, a student at the College of William and Mary in Williamsburg, Virginia, is working in the Langley Archives. She is adding to the database of NACA research authorizations. She has found a research authorization for work relating to the dirigible U.S.S. *Los Angeles* in 1927. Tucked in another research authorization file was a letter from Orville Wright, signed by his secretary, regarding a spin tunnel at Langley. In the file for RA-290, a 1937 letter was found that congratulated Eastman Jacobs for winning the Sylvanus L. Reed Award. At the request of a journalist, Lynne looked for evidence of a visit in 1935 of the Russian aircraft designer Andrei Tupolev. While no photographs were located, his signature was found in the visitor log book for 1 April 1935.

The Virginia Space Grant Consortium sponsors the LARSS program.

## Marshall Space Flight Center (MSFC)

An important series of records related to Dr. Wernher von Braun, the first Director of Marshall Space Flight Center (MSFC), has been located at the National Archives in Atlanta after years of presuming that the records no longer existed.

The records are informally known as "Von Braun's Weekly Notes." They cover the period of von Braun's tenure in Huntsville from the early 1960s until the 1970s. The notes have been recognized by many historians as a valuable source of information relating to the Saturn/Apollo era at Marshall and throughout NASA. They were used to track both programmatic and institutional issues and events at the Center. Over the years, many NASA and space historians have located scattered copies of the notes and made reference to them in their work. It is believed that the collection in Atlanta represents a complete set of the notes.

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*News from Headquarters and the Centers (continued)*

During the Saturn era, Marshall line managers solicited weekly notes from each of their subordinate organizations. As the notes passed through the chain of command at Marshall, additions or deletions were made based upon the importance of the issue. Each Monday, von Braun reviewed the notes and made his own notations in the margins. The notes, with von Braun's comments, were then filtered back to the organization deemed responsible for responding to von Braun's inquiry.

The notes have attracted attention from space historians as well as historians of organizational communications and management.

An inquiry from the Exploration Launch Vehicle Program Office prompted the renewed search to find the notes. MSFC records management personnel working with National Archives personnel in Georgia were responsible for relocating the notes.

Historians from MSFC plan to travel to the archives in Georgia in the near future to scan copies of the weekly notes electronically for retention in the Center's history office.

## Stennis Space Center (SSC)

In May, NASA announced its decision to build a new rocket engine test stand at Stennis Space Center (SSC). Tree clearing for the site of the new A-3 Test Stand at SSC began on 13 June. The construction of the A-3, NASA's first new large rocket engine test stand to be built since the 1960s, begins a historic era for America's largest rocket engine test complex. The SSC History Office is very involved in documenting this massive project through photographing, videotaping, and capturing oral history accounts for this important time in SSC's history.

The 300-foot-tall structure is scheduled for completion in August 2010. The A-3 will perform altitude tests on the Constellation's J-2X engine that will power the upper stage of the Ares I crew launch vehicle and the Earth departure stage of the Ares V cargo launch vehicle. The Constellation Program is NASA's plan for carrying out the nation's Vision for Space Exploration, which will return humans to the Moon and eventually take them to Mars and beyond.

## CALL FOR FALL INTERNS

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The NASA History Division is looking for capable undergraduate or graduate students to work as interns this coming fall. More information is available at <http://history.nasa.gov/interncall.htm> online. The deadline for fall 2007 applications is 15 August 2007.

## REMEMBERING THE SPACE AGE

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### Conference on the 50th Anniversary of the Space Age Sponsored by the National Aeronautics and Space Administration (NASA) and National Air and Space Museum (NASM) Divisions of Space History

22–23 October 2007

American Association for the Advancement of Science (AAAS) Auditorium  
Washington, DC

Please see <http://www.tisconferences.com/aaas/> for more information (registration, logistics, and updated agenda).

### Agenda

#### DAY 1 NATIONAL AND GLOBAL DIMENSIONS OF THE SPACE AGE

Has the Space Age fostered a new global identity, or has it reinforced distinct national identities? How does space history connect with national histories and with the histories of transnational or global phenomena such as the Cold War or the rise of global markets or global satellite communications?

**8:30 a.m.**      **Opening Remarks:** *Steven J. Dick* (NASA) and *Roger D. Launius* (NASM)

**9:00 a.m.**      **Keynote:** *John Robert McNeill* (Georgetown University)

#### **9:30–11:30 a.m.** Session 1: Invited Papers and Commentary

*Steven J. Dick*, Chair

30 min.      *Asif Siddiqi* (Fordham University)—National Aspirations on a Global Stage: Fifty Years of Spaceflight

30 min.      *John Krige* (Georgia Institute of Technology)—Building National Capability Through Regional and International Collaboration: The European Experience

30 min.      **Commentator:** *John Logsdon* (George Washington University)

30 min.      **Panel Q&A:** *Steven J. Dick*, Moderator

#### **1:00–3:00 p.m.** Session 2: Contributed Papers

*Michael Neufeld* (NASM)—Creating a Memory of the German Rocket Program for the Cold War

*Monique Laney* (University of Kansas)—Operation Paperclip in Huntsville, Alabama

*James Hansen* (Auburn University)—China's Human Spaceflight Program and Chinese National Identity

*Dwayne Day* (Space Studies Board/National Research Council)—The Central Intelligence Agency and Freedom of Space

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*Remembering the Space Age (continued)*

**Andrew Butrica**—The “Right” Stuff: The Impact of the Reagan Revolution and the Conservative Space Agenda on the U.S. Space Program

**Jonathan Coopersmith** (Texas A&M University)—The Railroad and the Space Program: A View from the 21st Century

**3:30–5:00 p.m. Roundtable**

**DAY 2 REMEMBRANCE AND CULTURAL REPRESENTATION OF THE SPACE AGE**

How is the historical record of the Space Age collected, preserved, displayed, and interpreted around the world, especially in the United States, Russia, the European Union, Canada, and China? What purpose do space museums serve, and what message do they convey? How accessible are space archives? How do the “official” versions of events square with the document trail and with eyewitness accounts? How is the Space Age represented in the arts, in the media, in the movies, in propaganda discourse, and so on?

**9:00 a.m. Keynote: *Emily S. Rosenberg***—Far Out: The Space Age in American Culture

**9:30–11:30 a.m. Session 1: Invited Papers and Commentary**

**Roger D. Launius**, Chair

30 min. **Constance Penley** (University of California at Santa Barbara)—Film, Arts, and the Media

30 min. **Martin Collins** (NASM)—A Second Nature Rising: Spaceflight in a Time of Representation

30 min. **Commentator: *Slava Gerovitch*** (Massachusetts Institute of Technology)

30 min. **Panel/Q&A: *Roger D. Launius***, Moderator

**1:00–3:00 p.m. Session 2: Contributed Papers**

**Amy Nelson** (Virginia Tech)—Lost in Space: Global Echoes of Sputnik 2

**Cathy Lewis** (NASM)—Cosmonaut Nostalgia in Film

**James Oberg**—Cosmonauts and Cosmo-NOTS: Image Falsification in the Soviet Manned Space Program

**Michael Soluri**—Discovering the Iconic in Space Exploration Photography

**Bettyann Holtzmann Kevles** (Yale University)—Space Art and Art in Space

**Robert Kennedy**—Robert Heinlein’s Influence on Spaceflight

**3:30–4:30 p.m. Roundtable**

**4:30–5:00 p.m. Closing Keynote: *Roger D. Launius***

## ANNUAL NASA HISTORY PROGRAM REVIEW

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by Christian Gelzer

This year's NASA History Program Review took place from 24 to 26 April and was hosted by Dryden Flight Research Center's history office. This year, NASA's historians and archivists were joined by independent scholars and a corporate archivist; the combination provided a nice blend of perspectives and experiences. Events were split between NASA's Aero Institute in Palmdale, California, and the Dryden Center itself, on Edwards Air Force Base.

Events began with a year-in-review address by Chief Historian Steve Dick, which included news of volume three of Boris Chertok's remarkable memoirs, the publication of the proceedings of the "Critical Issues in the History of Spaceflight" conference the previous year, and notes on the upcoming Agency-wide celebration of NASA's 50th anniversary in 2008.

The NASA History Division at Headquarters remains a pivotal archival resource with its continually growing collection, supervised by Jane Odom. Her work is complemented by the constantly expanding list of publications, which the History Division itself edits, supervises, commissions, and writes. The release of Michael Meltzer's *Mission to Jupiter* is but one example. The list of titles we can look forward to includes Thor Hogan's *Mars Wars: The Rise and Fall of the Space Exploration Initiative* and John Logsdon's seventh volume of *Exploring the Unknown: Selected Documents in the U.S. Civil Space Program*.

Papers from the conference included Joe Bassi's "The Sun Earth Connection," Douglas Mudgway's evolving biography of William Pickering (which is much anticipated in Pickering's—and Mudgway's—home town in New Zealand), and Jennifer Ross-Nazzal's intriguing and delightful "Skylab and the Women's Christian Temperance Union." Colin Fries presented a paper on space-related music over the last century; Bonnie Smith talked about producing history and developing the

archives for the Aerospace Corporation; and Bob Arrighi's "Documenting NASA's Historic Facilities" shed light on current historic preservation efforts at NASA's Glenn Research Center. NASA Dryden historians spoke about various projects under way or recently completed. Curtis Peebles's recent X-43 manuscript highlighted the troubles inherent in writing about projects recent enough to fall under export control, while Peter Merlin recounted the evolution of the Dryden history program itself. Christian Gelzer talked about the truck fairing research done at the Center in the 1970s and its influence on commercial vehicles.



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*Annual NASA History Program Review (continued)*

Lunches on two of the three days featured speakers: Al Bowers, a senior engineer at Dryden, talked about the Wright brothers, and Dill Hunley, former Chief Historian at Dryden, talked about a passel of books he has authored on American rocket development, books to be published by the University of Florida Press.

Updates from each Center continue to reveal the diversity of activities undertaken by NASA archivists and historians, and they run the gamut from unusual public inquiries to university press publications. Steve Dick's closing remarks included general discussion about what various Centers plan to do in recognition of the Agency's 50th anniversary, along with an enlightening and revealing account of the recent NASA Culture Survey, which echoed one done by Howard McCurdy in 1988.

Next year's meeting is slated to be hosted by Langley Research Center.

## 2007 NASA HISTORY AWARD

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The annual NASA History Award is given to a civil servant or contractor at one of NASA's Centers who has excelled in the promotion of NASA history to our internal and external audiences. It is with great pleasure that the Headquarters History Division presents the 2007 NASA History Award to Sallie Bilbo, Rebecca Strecker, and Shelia Reed of Stennis Space Center. These three deserving individuals in the Stennis History Office are to be commended for their efforts to document the impact of Hurricane Katrina on SSC and the surrounding community. In August 2005, during the aftermath of one of the greatest natural disasters in this country's history, the SSC team focused on capturing the significant events that took place during and after the hurricane. The Center was used as a shelter for thousands in the community and was also used as the staging ground for recovery efforts by the Federal Emergency Management Agency (FEMA) and rescue agencies from 15 states.

SSC History Office employees worked to record this event in a number of ways: through the use of a blog for all employees to input their personal stories and images; by conducting oral history interviews with key individuals who were at SSC during and after the storm; by creating video and photo documentation of the site and SSC volunteers working in the surrounding communities; and by offering, in conjunction with the Records Management Office, a special briefing on the proper documentation of significant materials to ensure that important information was accounted for during and after the storm. Additionally, they researched the Hurricane Camille recovery efforts to assist management in benchmarking the extent of relief and recovery activities in which Center personnel were involved for Hurricane Katrina; they also collected and provided significant information to the Katrina Report, a historical record produced by SSC of the impact Hurricane Katrina had on both Stennis and the Michoud Assembly Facility in Louisiana.



Dr. Steven J. Dick presents Shelia Reed with the annual NASA History Award at the NASA History Program Review meeting in Palmdale, California, on 24 April 2007.

## PUBLICATIONS

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### Forthcoming Publications

*The Wind and Beyond: A Documentary Journey into the History of Aerodynamics in America, Volume II: Reinventing the Airplane*, edited by James R. Hansen, with Jeremy Kinney, D. Bryan Taylor, and J. Lawrence Lee. The second volume in The Wind and Beyond series discusses the airplane design revolution of the 1920s and 1930s and the quest for improved airfoils.

*Mars Wars: A Policy History of the Space Exploration Initiative*, by Thor N. Hogan. This provocative book argues that the failure of President George H. W. Bush's Space Exploration Initiative (SEI) was the result of a flawed policy process.

*Facing the Heat Barrier: A History of Hypersonics*, by T. A. Heppenheimer. This book documents the history of hypersonics research in great detail. It should be published in early 2007.

*Dictionary of the Space Age*, by Paul Dickson. This new book will augment and update *The Origins of NASA Names* (NASA SP-4402, 1975) by including terms not in common usage approximately 30 years ago, as well as extensive etymological information.

*Flights of Discovery: The History of the Dryden Flight Research Center*, by Lane E. Wallace. This history of the first 50 years at the NASA Dryden Flight Research Center captures the spirit of the role flight research has played in aeronautical research and development and provides insightful accounts of most of the major flight research projects from 1946 to 1996.

## NEW ONLINE RESOURCES

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### NASA History Web Sites

The *Aeronautics and Space Report of the President, Fiscal Year 2005 Activities*, is available online from <http://history.nasa.gov/presrep.htm>.

Abe Gibson has prepared a useful guide for NASA History authors on how to create an index for their books. It is available at <http://history.nasa.gov/indexprep.htm>. Links to this and other similar guides for authors are available at <http://history.nasa.gov/program.html>.

### Other New Electronic Resources

The Gilder Lehrman Institute of American History produces *History Now*, a quarterly online journal for history teachers and students available at <http://www.historynow.org>. The 12th issue (June 2007) focuses on the classical age of exploration and may be of particular interest to readers.

## CALLS FOR PAPERS

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### *Quest: The History of Spaceflight Quarterly*

David Arnold, editor of *Quest: The History of Spaceflight Quarterly*, is seeking articles for publication. For more about the journal, see <http://www.spacebusiness.com/quest/>. Dr. Arnold just sent a note to the editorial board indicating that he has a terrific issue coming together for the 50th anniversary of the beginning of the Space Age and that he is looking for additional items, either related to the anniversary or not, for the fall 2007 issue and subsequent ones. If you would like to submit articles for publication or know of people who might have articles about ready for publication, please contact Dr. Arnold at [historyofspace@aol.com](mailto:historyofspace@aol.com).

### *International Test and Evaluation Association (ITEA) Journal*

The *ITEA Journal* is looking for history articles. Each quarter, there is a column entitled “Historical Perspectives” that includes short historical sketches of up to 1,200 words, accompanied by three or four photographs. Longer historical pieces have also been published in the main part of the journal for subjects of special interest to the association.

The subject matter for these columns has been intentionally broad. The editors are appealing to a wide range of test and evaluation (T&E) practitioners—not so much professional historians—so it is important to publish subjects that are varied and novel to keep the readers interested. The journal has done one about an incident involving flight testing during World War I, another on truck fairing tests designed to increase fuel economy during the energy crisis of the 1970s, and a third on the human factors—not just the machinery—involved in the near-fatal crash of a pilot of one of the NASA lifting bodies. All have endnotes and, although short, offer good scholarship to pique further reading and fresh perspectives.

All periods of history are open, and T&E is defined liberally: in the modern sense of complex, computerized experiments, but also the much less complex T&E as understood in earlier periods. For example, articles can be about specific aircraft (or subsystem) tests, influential individuals in the field of testing, technological turning points, or unique supporting subjects (for instance, the T&E of airline food!). It can also be a first-person account. Moreover, submissions need not be dominated solely by test and evaluation; ideally, they will feature T&E in some broader context.

Finally, the journal is informal in its editorial process. The journal gives the historical editor wide latitude to find submissions, so once he makes contact with a potential author and hashes out a subject, it is very likely that it will indeed be published. For more information, please contact Michael Gorn, Ph.D., NASA Dryden Flight Research Center, at [michael.gorn@dfrc.nasa.gov](mailto:michael.gorn@dfrc.nasa.gov).

## UPCOMING MEETINGS AND EVENTS

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14–19 August 2007, the International Committee for the History of Technology’s (ICOHTEC) 34th Symposium will meet in Copenhagen, Denmark. “Fashioning

Technology: Design from Imagination to Practice” is the symposium’s general theme. For details, see <http://www.icohtec2007.dk>.

29 August–2 September 2007, the Society of American Archivists will be holding its 71st annual meeting at the Fairmont Hotel in Chicago, Illinois. For additional conference information, visit <http://www.archivists.org/conference/index.asp>.

20–22 September 2007, the U.S. Naval Academy will host the 2007 Naval History Symposium in Annapolis, Maryland. The symposium is open to the public, but registration is mandatory. For more information, please see <http://www.usna.edu/history/symposium/> or call 410-293-6250.

16–17 October 2007, the Air Force Historical Foundation will host a symposium entitled “The Evolution of Air and Space Power: Know the Past, Shape the Future,” in Arlington, Virginia. See <http://www.afhistoricalfoundation.org> for more information on the symposium.

17–21 October 2007, the Society for the History of Technology will hold its annual meeting at the Capital Hilton in Washington, DC. The theme of the conference will be “SHOT@50: Looking Back, Looking Beyond.” For additional information on the meeting, see <http://www.historyoftechnology.org/annualmtg.html>.

18–19 October 2007, the Center for Cryptologic History at the National Security Agency will host the 11th Cryptologic History Symposium at the Conference Center of the Johns Hopkins Applied Physics Laboratory in Laurel, Maryland. Proposals for papers on all aspects of cryptologic history that present new research or perspectives will be considered. Please submit your proposals, via e-mail, to Dr. David Hatch at [dahatch@nsa.gov](mailto:dahatch@nsa.gov). If you have questions about the symposium, please call the Center at 301-688-2336.

28–30 October 2007, Louisiana State University (LSU) and Northrup Grumman Corporation will host a symposium on the LSU campus entitled “Risk and Exploration II: Earth as a Classroom.” This three-day event is modeled after a previous symposium, “Risk and Exploration: Earth, Sea, and the Stars,” held in Monterey, California, in September 2004. The NASA History Division published a proceedings book of this first conference (<http://history.nasa.gov/SP-4701/frontmatter.pdf>). For more information about this upcoming event, please see <http://www.riskexplore2007.com/> online.

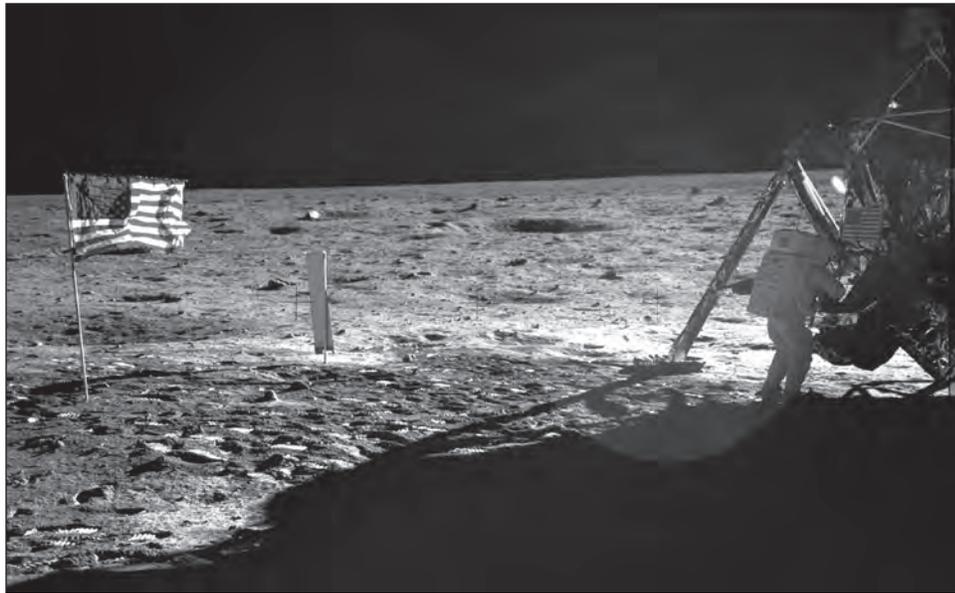
31 October–1 November 2007, the National Science Foundation and the Smithsonian Institution are hosting a conference entitled “Making Science Global: Reconsidering the Social and Intellectual Implications of the International Polar and Geophysical Years.” The conference will be held at the S. Dillon Ripley Center in Washington, DC. More information is available at <http://www.nasm.si.edu/makingscienceglobal> on the Web.

1–3 November 2007, the Mid-Atlantic Regional Archives Conference will hold its fall meeting in Williamsburg, Virginia, at the Williamsburg Marriott. For more information, see <http://www.lib.umd.edu/MARAC/conferences/conferences.html>.

3–6 January 2008, the American Historical Association will host its annual meeting at the Marriott Wardman Park and Omni Shoreham hotels in Washington, DC. For more information on the conference, see <http://www.historians.org/>.

## IMAGE IN SPACE HISTORY

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Center: JSC • Center Number: AS11-40-5886 • GRIN DataBase Number: GPN-2000-001209

Astronaut Neil A. Armstrong, Apollo 11 mission commander, at the modular equipment storage assembly (MESA) of the Lunar Module *Eagle* on the historic first extravehicular activity (EVA) on the lunar surface. Most photos from the Apollo 11 mission show astronaut Buzz Aldrin; this is one of only a few that show Neil Armstrong.

The NASA History Division, under the Office of External Relations, NASA Headquarters, Washington, DC 20546, publishes *News and Notes* quarterly.

To receive *News and Notes* via e-mail, send a message to [domo@hq.nasa.gov](mailto:domo@hq.nasa.gov). Leave the subject line blank. In the text portion, simply type “subscribe history” without the quotation marks. You will receive confirmation that your account has been added to the list for the newsletter and for receiving other announcements. We also post the latest issue of this newsletter at <http://history.nasa.gov/nltrc.html> on the Web.

Do you have more questions about NASA history in general? Please check out our NASA History Division Home Page at <http://history.nasa.gov> on the Web. For information about doing research in the NASA History Division, please e-mail us at [histinfo@hq.nasa.gov](mailto:histinfo@hq.nasa.gov) or call 202-358-0384.

We also welcome comments about the content and format of this newsletter. Please send comments to Steve Garber, newsletter editor, at [stephen.j.garber@nasa.gov](mailto:stephen.j.garber@nasa.gov).

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