



## FROM THE CHIEF HISTORIAN



Even as the National Aeronautics and Space Administration (NASA) ramps down activities relating to the 50th anniversary of the Agency, plans are gearing up to recognize a series of 40th anniversaries relating to Apollo. It was in October 1968 that Apollo 7, the first piloted launch in the series, went into Earth orbit to test Apollo hardware. By December, the famous Apollo 8 had circumnavigated the Moon, entering orbit on Christmas Eve; during the mission, its astronauts gave the famous reading from Genesis and took the iconic “Earthrise” photograph that had an impact around the world. The first lunar landing took place on 20 July 1969, with five more to follow, ending in December 1972.

As time passes, those events seem all the more remarkable in human history. During those five action-packed years, 24 men went to the Moon, 3 of them (Jim Lovell, Eugene Cernan, and John Young) twice. Twelve of them orbited silently above the bleak lunar landscape, and three others were whipped around the Moon in a “free-return trajectory” in a desperate attempt to return to Earth after an explosion aboard the Apollo 13 spacecraft. Twelve of the 24 lunar voyagers actually landed on the Moon, spending in total some 300 hours on the lunar surface, of which 80 hours were outside the Lunar Module, either with “boots on the ground” or with the astronauts actually driving around the spacecraft environs. These events seem incredible to us even now, as NASA makes plans to return humans to the Moon almost a half century later.

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## SOCIETY OF AMERICAN ARCHIVISTS CONVENES IN SAN FRANCISCO

By Jane H. Odom, Colin Fries, April Gage, and Leilani Marshall

The Society of American Archivists (SAA) held its annual meeting on 26–30 August in San Francisco with more than 1,700 attendees. It was SAA’s largest-ever West Coast gathering. The conference theme—to explore our professional identities in three strategic priority areas as identified by SAA (technology, diversity, and public awareness)—was especially meaningful. Participants attended sessions and section meetings, heard Mark Greene’s presidential address on defining the profession’s core values, talked with dozens of exhibitors in the Expo Hall, and visited with colleagues at a reception held at the San Francisco Public Library. Early in the week, more than a dozen local repositories opened their doors to visitors, and a small, enthusiastic group of archivists attended a San Francisco Giants baseball game. John Dean, former White House counsel, 1970–73, and a prolific author, served as keynote speaker. He had interesting observations about archives and archivists, as well as history and politics. Dean opened the session up for questions about halfway through his appointed time and seemed to enjoy the give and take with the audience. Representing NASA at this year’s annual meeting were Jane Odom and Colin Fries from Headquarters; April Gage and Leilani Marshall from Ames Research

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Center; Barbara Amago from the Jet Propulsion Laboratory; and Shelly Kelly from the University of Houston–Clear Lake, where the JSC Space History Collection is housed.

Jane attended a session on archival meaning and values; a presentation of case studies by individuals from several academic institutions on archiving digital manuscripts; a session on legal and ethical perspectives of returning displaced archives; and section meetings on government records and on reference, access, and outreach. A session she found especially meaningful dealt with confronting the challenges of digital preservation. In this session, representatives from three federal agencies (the National Archives and Records Administration [NARA], the Library of Congress [LOC], and the Government Printing Office [GPO]) discussed their experiences in this area. They described what is in electronic form and what is still hard copy, as well as new initiatives to handle digital information, including dissemination. The NARA speaker discussed the work of the Electronic Records Archives within the National Archives, while the LOC panelist commented that he felt that copyright law had not kept pace with digital technology. And, comforting to those of us who prefer hard-copy sources, the GPO representative opined that hard-copy printing will never go away but lamented that dealing with digital information has now been added to GPO's workload. Jane and April took the opportunity midweek to visit the Charles Schulz Museum and Research Center in Santa Rosa (<http://www.schulzmuseum.org>). They spent several hours visiting with archivist Lisa Monhoff and Museum Director Karen Johnson, touring the archives and museum, and even going behind the scenes. Lisa had pulled a number of items, several with NASA themes, from the archives collections to show our group.



Ames Research Center Archivist April Gage (left) and NASA Chief Archivist Jane Odom outside the Charles Schulz Museum in Santa Rosa, California.

Colin reports that one of the more intriguing sessions he attended described an Archival Web Capture Project. Dean Weber, archivist for the Ford Motor Company, described how his repository, along with the Ford Historical Resources Collaborative, has cooperated with the San Diego Supercomputing Center at the University of California San Diego to crawl and capture the Ford.com Web site on a quarterly basis, preserve the data, and provide access through <http://www.thehenryford.org>. The goal is to collect a long-term historical series of Web snapshots to document the Internet as one of the important methods car buyers use to make their choices. There are limitations with current Web crawler technology since it cannot capture dynamic graphics or Flash

multimedia. The project is eliminating duplicate links and will eventually provide the user with a prompt when he or she clicks on an outside link and leaves the site. The group entered the project thinking of it as a purely technological challenge, but one of the lessons learned was that it turned out to be about managing people and relationships. Despite the technological focus, it also involved using the traditional archival techniques of appraisal, accessioning, description, arrangement, preservation, and access.

April writes that among the business discussed at the Government Records Section meeting was the announcement of an improved National Association of Government Archives and Records Administrators Web site (<http://www.NAGARAresources.org>) through which archivists and records managers can share a wide variety of resources, as well as a new records certification program for administrators and archivists of local government archives. Attendees were encouraged to ask their congressional representatives to sponsor H.R. 6056, entitled “Preserving the American Historical Record,” which would authorize the Archivist of the United States to provide grants to states for preserving and disseminating historical records (see <http://www.archivists.org/pahrlindex.asp>). A representative from the Information Security Oversight Office (ISOO) within the National Archives discussed the activities of that office, including its ongoing review of federal agencies and recent recommendations to prioritize records of historical significance and establish a declassification center (see <http://www.archives.gov/isool/>). There was also an announcement of a new Council of State Archivists project—the Intergovernmental Preparedness for Essential Records—to provide state and local governments with records-related emergency training materials (see <http://www.statearchivists.org/liper/index.htm>). Sarah Demb, the Hub Records Management Advisor to the Museum of London, delivered the feature presentation, in which she discussed her role helping museums comply with two new legislative acts in the United Kingdom (U.K.) involving the freedom of information and data protection. Also of interest in this talk was Demb’s discussion of a Web site designed to disseminate information to museums in the U.K. about best practices in collections management (see <http://www.collectionslink.org.uk>). Commentary on Sarah’s paper was provided by Courtney Yevich from the Virginia Museum of Fine Arts.

Leilani recounts that in almost all of the sessions she attended that dealt with description, the phrase “Web 2.0” kept popping up. Archivists were talking about this concept particularly in relation to online finding aids and digital photograph collections. “Web 2.0” refers to Web site design and construction that applies different concepts of information-sharing techniques, such as bookmarking, tagging, commenting, blogging, podcasting, Really Simple Syndication (RSS), and editable sites like Wikipedia. Archivists leading the sessions asserted that using Web 2.0 concepts with online finding aids and digital collections is the next step in online description. They argued that as researchers and Internet users become more sophisticated in their interaction with information in the online environment, they expect repositories to be on the leading edge of this technological progression. One of the ways to meet the changing needs of users is through the application of Web 2.0 concepts.

Several repositories are already applying these concepts, such as allowing users to comment on photographs, provide information in a designated field, and apply descriptive “tags” to them. The most prominent use of this model is the Library of Congress’s photograph pilot project on Flickr, an online photo management and sharing application. Other uses of Web 2.0 applications allow users to leave reviews of finding aids and Web sites, to refer other users of a guide to similar or related sources, to allow users to create their own personalized “libraries” of digital images and guides to meet their own research needs, and to allow users to comment on information contained in finding aids and other parts of a repository’s Web site. Using Web 2.0 concepts in this environment will demand a shift in values from archivists, who are not used to allowing users to edit content or allowing them to

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*Society of American Archivists Convenes in San Francisco (continued)*

take apart collections and present them in other ways. Whether or not to use these concepts, and in what manner, are decisions that each repository will need to make on its own, but there is no doubt that the changing needs of researchers are definitely causing archivists to reevaluate the current way their collections are being used and accessed, particularly in the online environment.

Mark your calendar now—next year’s annual meeting of the Society of American Archivists will be held 11–16 August 2009 in Austin, Texas. Y’all come!

*From the Chief Historian (continued)*

When Neil Armstrong and Buzz Aldrin landed on the Sea of Tranquility on 20 July 1969, they stayed a little less than a day, and they traveled less than half a mile on foot. During the last Apollo mission, Apollo 17, members of the crew landed on the Taurus-Littrow highlands on 11 December 1972 and stayed for three days, during which Harrison Schmitt and Eugene Cernan traveled some 19 miles in the lunar roving vehicle. Though human footprints are well preserved at the six landing sites and rover tracks surround three of them, not a step has been taken on the lunar surface since that time.

Although the importance of the Apollo missions is still debated, the difficulty and the expense are widely recognized. At the peak of the Apollo era, during one of the most tumultuous decades in American history, NASA expenditures constituted almost 4 percent of the federal budget. Since that time, NASA’s budget has remained relatively steady at less than 1 percent.

Eight years after President Kennedy’s challenge, the goal was met, but only after gargantuan efforts and funding resources unlikely ever to be seen again in the space program over such a short timespan. Among those efforts was the construction of the Saturn V launch vehicle, led by the legendary Wernher von Braun at Marshall Space Flight Center, with Boeing, North American Aviation, and Douglas Aircraft Company as prime contractors for each of the Saturn stages. The Apollo spacecraft themselves—the “chariots for Apollo” known more technically as the Command and Service Modules—were also the responsibility of North American Aviation. Hundreds of subcontractors, thousands of engineers, tens of thousands of workers, and many unsung heroes played their roles in sending Americans to the Moon. The Saturn V was composed of 3 million parts, the Command and Service Modules 2 million, and the Lunar Module 1 million. As Apollo 11 astronaut Michael Collins put it, “All 6 million worked, nearly all the time.”

Was it all worth it? The Apollo program has been criticized for being driven by politics, dominated by engineers, and deaf to science; after all, the only scientist who traveled to the Moon was Harrison Schmitt on Apollo 17, the last voyage. What, in the end, did Apollo achieve? Aside from its geopolitical goals, and despite the clear backseat status of science, a considerable amount of science was in fact returned from the Moon. As Donald Beattie has described in his book *Taking Science to the Moon*, almost 5,000 pounds of experimental equipment was landed on the Moon, including the Apollo Lunar Surface Experiments Package (ALSEP) on each of the last five Apollo missions. Eight

hundred forty pounds of lunar material was returned and analyzed. Astronauts traversed 65 miles either on foot or in the lunar rover in support of field geology and geophysical studies. And during the last three missions, detailed data were collected from the orbiting Command and Service Modules. The overall result is a much better understanding of the nature and origin of the Moon and its relation to Earth. The top 10 scientific discoveries from the Apollo missions, as ranked by the office of the curator for planetary materials at NASA's Johnson Space Center, are found at <http://www.lpi.usra.edu/expmoon/science/lunar10.html>.

No one would have guessed in 1972 that almost a half century would pass before even the possibility that humans would return to the Moon was seriously broached. Though the Russians would manage several more robotic lunar missions, including a lunar sample return in 1976, it would be more than 20 years before Americans returned to the Moon with even a robotic emissary, the Clementine spacecraft, in 1995. Lunar Prospector followed in 1998, and the Lunar Reconnaissance Orbiter is on schedule to launch in March 2009, intended as a precursor to human missions now being planned by 2020.

How will history judge the voyages of Apollo? Pulitzer Prize-winning historian Arthur M. Schlesinger, Jr., a special assistant to President Kennedy, ventured one opinion when he wrote in 2004: "It has been almost a third of a century since human beings took a step on the Moon—rather as if no intrepid mariner had bothered after 1492 to follow up on Christopher Columbus. Yet 500 years from now (if humans have not blown up the planet), the 20th century will be remembered, if at all, as the century in which man began the exploration of space." Although a historian of politics and world affairs, Schlesinger did not rank war in the century's top 10 events. Wars come and go and affect many people, but the first venture into space happens only once and holds infinite promise—and peril.

On the other hand, there are some, historians among them, who think the Apollo program was time and money misspent and that analogies to Columbus are misplaced. In reviewing Andrew Chaikin's book *A Man on the Moon* in the *New York Times Review of Books*, historian of technology Alex Roland called Chaikin's retelling of the Apollo story "the great American legend of the late 20th century," replete with heroic astronauts and epic tales. Eschewing Apollo's role in exploration and pointing to the lack of science on the missions, he downplayed the significance of the voyages of Apollo.

Critics are entitled to their opinions, but in my view, the Apollo voyages were indeed an accomplishment of mythic proportions, justifying mythic retellings. History may well side with Mr. Schlesinger, but what happens over the next few decades will determine whether the expeditions of Apollo are more akin to the Vikings' brief forays to North America under Leif Eriksson or to the more sustained effort heralded by Columbus (in this case, without the exploitation of natives). In the long view of history, the success or failure of NASA's current attempt to return humans to the Moon, proceed to Mars, and spread throughout the solar system will also be judged accordingly. We are now in a test to see whether humans can be motivated by a journey of exploration rather than a race, by international cooperation rather than competition. History will be watching.

Steve Dick

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*From the Chief Historian (continued)*

### Further Reading

#### Selected Readings for the Apollo 40th Anniversaries

*Apollo Lunar Surface Journal*, available at <http://history.nasa.gov/lalsj/>. This source contains a tremendous amount of information on astronauts' lunar surface activities.

Donald A. Beattie, *Taking Science to the Moon: Lunar Experiments and the Apollo Program* (Baltimore and London: Johns Hopkins University Press, 2001).

Roger Bilstein, *Stages to Saturn: A Technological History of the Apollo/Saturn Launch Vehicles* (Washington, DC: NASA SP-4206, 1980 and 1996), available online at <http://history.nasa.gov/SP-4206/sp4206.htm>.

Courtney Brooks, James Grimwood, and Loyd S. Swenson, Jr., *Chariots for Apollo: A History of Manned Lunar Spacecraft* (Washington, DC: NASA SP-4205, 1979), available online at <http://www.hq.nasa.gov/office/pao/History/SP-4205/cover.html>.

Andrew Chaikin, *A Man on the Moon: The Voyages of the Apollo Astronauts* (New York: Penguin Books, 1994). This book was the basis for the HBO miniseries *From the Earth to the Moon*.

Michael Collins, *Liftoff: The Story of America's Adventure in Space* (New York: Grove Press, 1988).

W. David Compton, *Where No Man Has Gone Before: A History of Apollo Lunar Exploration Missions* (Washington, DC: NASA SP-4214, 1989), available online at <http://history.nasa.gov/SP-4214/cover.html>.

Edgar M. Cortright, ed., *Apollo Expeditions to the Moon* (Washington, DC: NASA SP-350, 1975), available online at <http://www.hq.nasa.gov/office/pao/History/SP-350/cover.html>.

Michael Gray, *Angle of Attack: Harrison Storms and the Race to the Moon* (New York: Penguin, 1994).

James R. Hansen, *First Man: The Life of Neil A. Armstrong* (New York and London: Simon and Schuster, 1975).

Stephen B. Johnson, *The Secret of Apollo: Systems Management in American and European Space Programs* (Baltimore: Johns Hopkins University Press, 2002).

W. Henry Lambright, *Powering Apollo: James E. Webb of NASA* (Baltimore: Johns Hopkins University Press, 1995).

Lunar and Planetary Science Institute. An extensive source of information on past and future missions to the Moon is available at <http://www.lpi.usra.edu/expmoon/>.

Charles Murray and Catherine Bly Cox, *Apollo: The Race to the Moon* (New York: Simon and Schuster, 1989).

Richard W. Orloff, *Apollo by the Numbers: A Statistical Reference* (Washington, DC: NASA SP-2000-4029, 2000), available online at <http://history.nasa.gov/SP-4029/SP-4029.htm>.

Robert C. Seamans, Jr., *Project Apollo: The Tough Decisions* (Washington, DC: NASA SP-2005-4537), available online at <http://history.nasa.gov/monograph37.pdf>.

Asif Siddiqi, *Challenge to Apollo: The Soviet Union and the Space Race, 1945–1974* (Washington, DC: NASA SP-2000-4408, 2000).

Billy Watkins, *Apollo Moon Missions: The Unsung Heroes* (Bison Books, 2007).

More publications related to Apollo may be found at <http://history.nasa.gov/series95.html>.

## NEWS FROM HEADQUARTERS AND THE CENTERS

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### Headquarters

Jane Odom continues to evaluate and acquire new material for the Historical Reference Collection (HRC). One notable collection she acquired recently was a large amount of Participant in Space (teacher, journalist, educator) material, 1977–2003, from the Office of Education. Jane appraises material for historical value and directs the subsequent processing of collections, answers reference requests, and facilitates the entry of our international visitors into the building. She is pleased to report that after several months of work, all of the Administrators' and Deputy Administrators' speeches have been published on the Headquarters Historical Reference Collection Web site. These speeches and other useful historical documents may be found at <https://mira.hq.nasa.gov/history/> online.

Collectively, Colin Fries, John Hargenrader, and Liz Suckow all share reference duties, answering inquiries received by e-mail, assisting walk-in researchers, and helping Jane with Freedom of Information Act (FOIA) requests. They also recently assisted Jane in reviewing more than a dozen speeches in the Administrators series before they were published to the new HRC Web site described above.

Liz has completed a preservation project on the Mercury, Gemini, and Apollo astronaut biographical files. She appraised a collection of Spaceflight Advanced Projects reading files from the 1990s, adding the items she retained to the HRC, and processed a collection of source materials on NASA's Spaceflight Tracking and Data Network from the author of a new history book on that subject. Liz began appraising two collections recalled from the Federal Records Center: one containing a small amount of George Low correspondence on the Mercury Program and the other a large collection of Apollo Program and Office of Policy files. She is making copies of historically significant items from these collections and adding them to the HRC. Also, Liz began entering descriptive information about our oral history collection into the database, scanned and uploaded to the database the George Mueller speech collection, and scanned and uploaded the Fred Gregory chronological correspondence files, 2002–05. Finally, she is doing historical background research for an Apollo 40th-anniversary working group.

Colin finished scanning 9 cubic feet of Office of External Relations chronological correspondence files, 2000–03, and checked the portable document format (PDF) files into the database. Currently, he is scanning a collection of life sciences chronological files, 1993–2003. He completed processing the collection of engineer John Sloop and assisted in proofreading various publications and 50th-anniversary materials. Additionally, Colin is reprocessing the Headquarters organization files and continues to maintain the History Division Web pages, where he is currently focusing on updating the Forecast of Upcoming Anniversaries pages.

John is continuing to scan the Office of Safety and Mission Assurance chronological correspondence files, 1986–2001. He is happy to report that the recent purchase of new scanners has helped to speed up the process significantly. John continues his preservation work, removing and reformatting deteriorating newspaper clippings in

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*News from Headquarters and the Centers (continued)*

various collections as he finds them. He is nearing completion of a project to add a collection of over 100 Plum Brook Reactor Facility images for the GREAT Images in NASA (GRIN) photo database online at <http://grin.hq.nasa.gov/>. Look for these new images to appear soon on GRIN.

## Ames Research Center (ARC)

April Gage and Leilani Marshall earned an Ames safety award (ASAP II) recognizing their outstanding efforts in developing the *NASA Ames History Office Disaster Preparedness Plan*.

Center Director Pete Worden hosted a Directors' Round Table on 16 September. Four of his predecessors—Hans Mark, Sy Syvertson, Dale Compton, and Scott Hubbard—returned to offer their insights on what makes Ames successful. Ames has begun planning a series of special events to mark its upcoming 70th anniversary on 20 December 2009. These will have an “evolution” theme aligned with local history-of-science events to mark the 150th anniversary of Charles Darwin's publication *On the Origin of Species*.

Jack Boyd and Glenn Bugos presented a paper entitled “Why Space Research and Space Exploration?: NASA Ames Research Center Contributions to NASA's 50 Years” to the American Institute of Aeronautics and Astronautics (AIAA) Space 2008 meeting in San Diego. Jack also made a major presentation to the National Hispanic University.

April Gage completed in-house scanning and preservation measures to 102 reports and engineering design documents in the Pioneer Project Records, 1952–96 collection (AFS8100.15A). In addition, she continues to acquire historical records and artifacts from around the Center. Notable accessions include a new batch of papers from late planetary scientist James Pollack, a full-scale model of the Galileo descent probe and deceleration module aeroshell, and a functioning copy of the Viking gas exchange experiment module. April organized an open house for the Ames Family Day, and history fans flocked to our door. April, along with Jane Odom, also got an extensive advanced viewing of the upcoming space-themed exhibit, entitled “To The Moon: Snoopy Soars with NASA,” at the Charles Schulz Museum in Santa Rosa, California.

The NASA Ames History Office welcomed two new interns. James D. Anderson will be doing special writing projects on the later history of NASA Ames. He recently completed two bachelor's degrees, one in astrophysics and one in the history of science, both from the University of California at Berkeley. Shoshana Shwartz is an undergraduate in the public history program at San Jose State University and will be helping to process archival collections. And we were delighted to host Ray Macauley, a historian at the University of Manchester, who is undertaking a detailed study of the Pioneer plaque for a project on representation strategies in interstellar communication.

We bid adieu to intern Allison Tara Sundaram, who is now at the University of Leeds pursuing a master's degree in museum studies. In addition to being of great help in the archives, Allison surveyed, inventoried, and performed extensive preservation measures on nearly 10 cubic feet of materials in the Pioneer Project Records,

1952–96. Furthermore, Allison preserved and described 2.5 cubic feet of artifacts and records, including exhibits on tektites and memorial condolences compiled following the *Columbia* accident.

The NASA Ames Historic Preservation Office won a 2008 Preservation Design Award from the California Preservation Foundation for its report entitled “Evaluation of Historic Resources Associated with the Space Shuttle Program at Ames Research Center.” In October 2008, a new dirigible returned to Moffett Field with Airship Ventures, Inc.—though stationed in Hangar 2 rather than Hangar 1. It darkened our skies 75 years to the month after the USS *Macon* first arrived at Moffett Field.

## Glenn Research Center (GRC)

Kevin Coleman, GRC History Officer, has retired after 38 years of federal service. Kevin started the Glenn history program in the mid-1990s. Since that time, it has grown tremendously and has been one of the most active and prolific history programs in the Agency. In 2005, Kevin was awarded the first NASA History Award for his achievements. Under Kevin’s direction, six books and two documentaries were produced on the history of various Glenn programs and facilities. He also spearheaded the effort to host the “Realizing the Dream of Flight” symposium in celebration of the centennial of flight. Best wishes, Kevin! Anne Power will be assuming the role of GRC History Officer.

*Of Ashes and Atoms*, NASA’s first feature-length history documentary, tells the history of the NASA Plum Brook Reactor Facility. After it aired on WGTE, Toledo’s public television station, last December, *Of Ashes and Atoms* received a nomination in the historical documentary category for the Lower Great Lakes Regional Emmy awards. Awards were held 13 September. Unfortunately, Glenn did not walk away a winner, but as they say in the business, it’s an honor to be nominated!

The Altitude Wind Tunnel interactive CD-ROM is now available. The disk includes an overall chronicle of the historic facility’s involvement with propulsion research, Project Mercury, and the Centaur program; an interactive timeline and facility map; photos and film footage; and technical reports. Copies of the CD-ROM are available by contacting the NASA Headquarters History Division or the Glenn Research Center history office. A monograph on the topic of the Altitude Wind Tunnel should be available in 2009.

## Jet Propulsion Laboratory (JPL)

After the Explorer anniversary celebrations in January, Erik Conway continued work on his Mars exploration book. Erik has written up through the crash of the Mars Polar Lander in 1999. Erik has carried out 16 oral histories with participants this spring and summer in support of the project’s next phase: the completion of the Mars 2001 Odyssey mission and the decision to embark on the Mars Exploration Rover mission. Erik plans to complete the manuscript (though the Mars Exploration Rover mission) next year.

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*News from Headquarters and the Centers (continued)*

Erik has also been contributing to the new JPL climate science Web site, which is online at <http://climate.jpl.nasa.gov>. Erik has written an essay on JPL and NASA's role in climate science that is "live" and has essays on terminology and on temperature measurement controversies in the pipeline. Additionally, Erik has an essay on historical carbon dioxide measurement forthcoming on a related Web site for the Atmospheric Infrared Sounder on the Aqua satellite. This effort should taper off as the climate site gets its new science writer up to speed.

Finally, Erik is working on three articles for scholarly publication. Erik has completed the second draft of last year's International Geophysical Year paper, "The International Geophysical Year and Planetary Science," and submitted it to the second round of review. Erik is contributing a paper to the NASA 50th-anniversary conference at the end of October on the intersection of Earth and planetary science, and he is also working on a paper for a volume on planetary exploration that was funded via the Science Mission Directorate's recent call for historical proposals.

Erik's atmospheric science history is due out from Johns Hopkins University Press in November. It can be ordered from the fall 2008 catalog, from the usual online bookstores, or from [http://www.press.jhu.edu/books/title\\_pages/9567.html](http://www.press.jhu.edu/books/title_pages/9567.html). Many thanks to Steve Sanford, Donna Lawson, and Mike Finneran at Langley Research Center for their patience during this long, drawn-out publication process.



Flight controllers in the Mission Operations Control Room celebrate the successful conclusion of the Apollo 11 lunar landing mission. The photo, taken on 24 July 1969 in the Mission Control Center at the Manned Spacecraft Center, Houston, Texas, serves as the cover for the current *Houston History* magazine honoring NASA's 50th anniversary. (Source: JSC S69-40022)

## Johnson Space Center (JSC)

The arrival of Hurricane Ike in the Houston area the weekend of 12–13 September 2008 affected the Center and its surrounding vicinities. Fortunately, the History Office and the history collection and archives were not damaged. As the area recovers, work has resumed, and on 1 October, as planned, the Center's employees enjoyed a picnic on the grounds of JSC to celebrate the 50th anniversary of the Agency.

The JSC History Office produced the fall issue of the *Houston History* magazine for the University of Houston Center for Public History in recognition of the Agency's 50th anniversary. JSC History Coordinator Rebecca Wright served as the guest editor, and contributing the articles were Mike Coats, JSC Center Director; Sandra Johnson and Dr. Jennifer Ross-Nazzal, from the JSC History Office; student researcher Jessica Cannon; and Shelly Henley Kelly, archivist from the University of Houston–Clear Lake and for the JSC History Collection. Articles focus on the years 1958 to 1978 and on JSC. Included is an edited transcript from an interview conducted

with pioneer flight director Chris Kraft discussing the historical importance of Apollo 8. Also featured are imagery from the JSC repository, thoughts from those working in Mission Control for the Apollo 11 lunar landing, details about the first flag on the Moon, the connection between JSC and area universities, and an article about the 35 new individuals who in 1978 helped to change the face of human spaceflight.

Also, this past summer marked the 11th consecutive year the JSC history team has enjoyed working with student interns. These graduate students spent 10 weeks researching and writing biographical profiles on people who will be interviewed in the future as part of the ongoing JSC Oral History Project.

## Marshall Space Flight Center (MSFC)

The History Office at Marshall Space Flight Center is utilizing new forms of low-cost digital technology to improve the speed and quality of services that the History Office offers its patrons.

More than five years ago, the office began converting paper typescript documents into portable document format (PDF). Now, the office can search through almost 50 years of the *Marshall Star* newspaper in a matter of minutes instead of randomly flipping through bound volumes.

More recently, the Marshall historian has also created a trial process for scanning documents off-site using a laptop computer and a portable scanner like the one he took to the National Archives Southeastern Regional Office in Morrow, Georgia. There, he scanned 2,000 pages of the Marshall Space Flight Center weekly notes that Dr. Wernher von Braun collected as Director from 1960 until 1970. "Scanning is not a new thing," said Marshall historian Mike Wright. However, there are lessons to learn about using it in places like the National Archives. One involves selecting the right scanner. The scanner must have a flat glass bed without an automatic document feeder that might jam and physically damage the documents. This means that the person doing the scanning must lay each sheet on the scanner bed individually. Using a scanner with a push-button panel to approve each scan saves more time than manipulating a mouse. The results from Georgia demonstrated the capability to scan 125 sheets in 36 minutes.

The History Office has also acquired a relatively new low-cost tool especially designed to scan bound publications without breaking the bindings. This new device is called a book scanner and looks very much like a regular flatbed scanner except that the outer edge of the scanner glass is almost flush with the outside edge of the scanner unit. This design makes it easy to get clean scans of full-book pages instead of using a standard paper copier that sometimes cuts off the inside left page and the inside right page. The scanner costs under \$400. One test-run resulted in scanning more than 100 book pages in color or in black and white in less than an hour.

The History Office is also using an inexpensive new tool to convert 35-millimeter digital slides into full-size computer images. Tabletop slide scanners have been around for a few years, but they involve scanning slides or film negatives at an extremely high resolution, which drains the computer's memory and delays the transfer. One solution involves using a small digital scanner costing around \$100.

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The entire unit is about the size of a soap dispenser in a public restroom. The scanner allows the user to insert a tray of about six slides that appear relatively fast on the computer screen in preview mode. The operator simply hits a button on the scanner and quickly sees the results. One cautionary note is that the quality of the images from the scanner will not match the quality expected from high-end equipment. However, the speed at which the slides can be transferred to digital format makes it practical to use the collected images as an index for selecting particular slides that can be transferred using more expensive processes involving high-end equipment. In a matter of a few days, Roena Love and Janie Crawford, from the Marshall History Office, scanned more than 400 35-millimeter slides into digital images.

## Stennis Space Center (SSC)

In October 2007, Stennis Space Center launched a yearlong celebration of NASA's 50th anniversary with events and exhibits showcasing the past five decades of space exploration.

StenniSphere, the visitor center at Stennis Space Center, introduced a 50th-anniversary exhibit that traveled across Mississippi and southern Louisiana. The highlight of the exhibit was a Moon rock brought to Earth by astronauts on the Apollo 15 mission in August 1971. The exhibit also featured models depicting launch vehicles from each era in the evolution of NASA's space program—the Goddard rocket, the Mercury Redstone, the Saturn V, and the Space Shuttle. Models of the Ares I and Ares V offered a preview of NASA's upcoming Constellation Program. A 40-foot timeline provided a look back at key events in NASA's history, which included events such as the earliest days of rocketry, Neil Armstrong's historic first steps on the Moon, and the initial construction of the International Space Station. The exhibit also featured life-sized cutouts depicting how technology created for NASA affects everyday life.

In January, representatives from Stennis traveled to Jackson, Mississippi, for NASA Stennis Space Center Day at the Capitol. During the event, lawmakers passed a resolution declaring 30 January 2008 NASA Space Day in Mississippi. The resolution commemorated NASA's 50th anniversary and encouraged Mississippians to recognize the significant accomplishments that NASA's Stennis Space Center has contributed to the state as well as the nation.

Stennis also hosted a ceremony to mark the Center's designation as an American Institute of Aeronautics and Astronautics Historic Aerospace Site. The 10 April event coincided with a sitewide employee picnic. Attendees received 50th-anniversary pins and mouse pads featuring a picture of Stennis employees forming the number 50.

The History Office at Stennis has also taken part in the anniversary celebrations. Stennis released a series of articles to area newspapers detailing the history of the Center—from the selection of southern Mississippi as the site of a rocket engine testing complex through Stennis's current role in the Space Shuttle Program. Also, *Lagniappe*, Stennis Space Center's monthly newsletter, features recurring articles highlighting significant events in Stennis history. A new "This Week in History" section has been added to Stennis's online weekly publication, *Orbiter*. The piece includes a historic photograph with a caption.

## NEW NASA HISTORY PUBLICATIONS

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*Altitude Wind Tunnel at NASA Glenn Research Center CD-ROM* (SP-2008-4608). Bob Arrighi at NASA Glenn has put together a wealth of documents, still and moving images, and other information about this historic wind tunnel. Members of the public may request a copy of this disk by sending a self-addressed, stamped envelope to the NASA History Division, Room CO72, NASA Headquarters, 300 E Street SW, Washington, DC 20546.

## OTHER NEW AEROSPACE HISTORY PUBLICATIONS

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Compiled by Chris Gamble

*Forgotten Aviator Hubert Latham: A High-Flying Gentleman*, by Barbara Walsh (U.K.: The History Press LT, September 2007). This book is the authentic biography of pioneer aviator Hubert Latham, who was Louis Blériot's rival for the *Daily Mail's* prize for the first airplane flight across the English Channel in July 1909.

*The Space Environment and Its Effects on Space Systems*, by Vincent L. Pisacane (American Institute of Aeronautics and Astronautics, May 2008). This full-color textbook will help students and professionals understand the space environment and its influence on spacecraft design, engineering, and performance.

*Managing Space Radiation Risk in the New Era of Space Exploration*, by the National Research Council (National Academies Press, May 2008). As part of the Vision for Space Exploration (VSE), NASA is planning for humans to revisit the Moon and someday go to Mars. An important consideration in this effort is protection against exposure to space radiation. This book presents an assessment of current knowledge about radiation in the space environment, an examination of the effects of radiation on biological systems and mission equipment, an analysis of current plans for radiation protection, and a strategy for mitigating the risks to current and future astronauts.

*Smithsonian Atlas of World Aviation*, by Dana Bell (Collins, June 2008). Featuring 100 newly commissioned and historic maps as well as 200 related photographs, navigation charts, and historic artifacts, the *Smithsonian Atlas of World Aviation* charts the awe-inspiring history of flight around the world. Dana Bell, a leading expert on aviation history, explains the fascinating stories behind aviation's great technological advances and provides historic and social context that highlights the many ways in which these advances have changed the course of human history.

*Blast Off: An Innocent's Adventures at the Dawn of the Space Age*, by Ken McCracken (Tuttle Publishing, July 2008). With the escalation of the Soviet-American "space race," Ken McCracken, pioneer researcher into cosmic radiation, soon found financial support to send his cosmic-radiation detectors aloft aboard NASA satellites. His discoveries are credited with having saved astronauts' lives, particularly on the lunar landing missions. In *Blast Off*, using his subtle humor, McCracken reveals the

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*Other New Aerospace History Publications (continued)*

buzz of working at the heart of the space program with the best and brightest minds of the era. He brings the reader an often lighthearted glimpse at the inner workings of NASA and reveals some little-known glitches.

*Solar Sails: A Novel Approach to Interplanetary Travel*, by Giovanni Vulpetti, Les Johnson, and Gregory Matloff (Springer, July 2008). This book describes solar sails, how they work, and how they will be used in the exploration of space. The book is written in an easily readable manner that does not necessitate any prior knowledge of physics or solar sailing. It discusses current plans for solar sails and also describes how advanced technology, such as nanotechnology, might enhance solar-sail performance.

*Space Shuttle Program: How NASA Lost Its Way*, by R. Michael Gordon (McFarland, July 2008). This critical study of NASA's Space Shuttle program provides an in-depth examination of the events, decisions, and policies that may have contributed to the horrific destruction of the Shuttles *Challenger* and *Columbia*. It first traces the early development of NASA's Shuttle program, specifically examining the problems associated with the designs of Shuttles OV-099 (which was to become *Challenger*) and OV-102 (which was to become *Columbia*). (OV stands for "orbiter vehicle.") A detailed look at the first successful flights made by *Challenger* and *Columbia* and the cancellation of top-secret Shuttle flight STS-51C (which would have launched under nearly identical weather conditions to those of the ill-fated *Challenger* mission STS-51L) is provided. An in-depth assessment of the Shuttles' disastrous final launches follows, including detailed accounts of the postflight search and rescue operations, the official investigations into each accident, and the impact of each disaster on the future of NASA's human space program.

*Dependable Engines: The Story of Pratt & Whitney*, by Mark Sullivan, Sullivan & Lashane Public Relations (American Institute of Aeronautics and Astronautics, July 2008). Pratt & Whitney engines helped to win World War II by powering much of the U.S. fighter fleet as well as many British planes. Since then, they have powered record-breaking aircraft such as the Boeing B-50, the F-100 Super Sabre, and the SR-71 spy plane. These dependable engines are also responsible for powering the first generation of commercial jet transports that brought the world to our front doors—the Boeing 707, the Douglas DC-8, the Boeing 727 and 737, and the Douglas DC-9. Today, Pratt & Whitney engines provide power for everything from land-based power stations, business jets, and helicopters to large commercial aircraft, fifth-generation fighters, and piloted and robotic space vehicles.

*The International Space Station: Building for the Future*, by John E. Catchpole (Springer-Praxis, July 2008). This book covers, in great detail, the newest construction and uses of the International Space Station (ISS) from 2002 to 2008, including the recent delivery and installation of the final piece of U.S. hardware, Node 2, and all European and Japanese hardware. The book also explains the impact of the tragic loss of *Columbia* on the ISS and the American space program in general. Furthermore, it introduces the Ares 1 launch vehicle and the Orion spacecraft, designed to return humans to the Moon, and discusses them as they are involved in the ISS program.

*Landscapes of Mars: A Visual Tour*, by Gregory L. Vogt (Springer, September 2008). This is essentially a picture book with beautiful and exciting images that provide a

visual tour of Mars. All the major regions and topographical features are shown and supplemented with chapter introductions and extended captions.

*Space Enterprise: Living and Working Offworld in the 21st Century*, by Philip Harris (Springer-Praxis, September 2008). Dr. Philip Harris provides the vision and rationale as to why humanity is leaving its cradle, Earth, to use space resources, as well as pursuing lunar industrialization and establishing offworld settlements. As a management/space psychologist, Dr. Harris presents a behavioral science perspective on space exploration and enterprise. He not only provides a critical review of what is happening in the global space community, but he also offers specific strategies for lunar economic development. Harris analyzes the human factors in contemporary and future space developments, especially relative to the deployment of people in space. This user-friendly volume offers numerous photographs, diagrams, exhibits, and case studies.

*The Search for Life Continued: Planets Around Other Stars*, by Barrie Jones (Springer-Praxis, July 2008). Barrie Jones addresses the question, Are we alone?—one of the most frequently asked questions by scientists and nonscientists alike. The author concentrates on planetary systems beyond our own but starts with life on Earth, which is the only life we know to exist and which provides guidance on how best to search for life elsewhere. Planets are the most likely abode of life, and so we start the quest with the search for planets beyond the solar system—exoplanets. The methods of searching are outlined and the nature of hundreds of exoplanetary systems so far discovered described. In the near future, we expect to discover habitable Earth-like planets. But are they actually inhabited? How could we tell? All will be revealed.

*The Yearbook on Space Policy 2006/2007: New Impetus for Europe*, edited by the European Space Policy Institute, Kai-Uwe Schrogl, Charlotte Mathieu, and Nicolas Peter (Springer, August 2008). *The Yearbook on Space Policy* aims to be the reference publication analyzing space policy developments. Each year, it presents issues and trends in space policy and the space sector as a whole. Its scope is global, and its perspective is European. The *Yearbook* also links space policy with other policy areas. It highlights specific events and issues and provides useful insights, data, and information on space activities.

*Unmasking Europa: The Search for Life on Jupiter's Ocean Moon*, by Richard Greenberg (Springer-Praxis, August 2008). In *Unmasking Europa*, Richard Greenberg tells the story of how he and his team of researchers came to believe that the surface of Europa is in fact a crust so thin that it can barely hide an ocean of liquid water below. The author describes, in clear but technically accurate terms—and with extensive illustrations (including more than 100 NASA mission images)—the remarkable history of research on Europa over the last four decades. The book also provides unique insights into how “big science” gets done today, and it is not always a pretty picture. From his perspective as a professor of planetary sciences at the University of Arizona and a quarter-century-long member of the Imaging Team for the Galileo space mission, Greenberg describes how personal agendas (including his own) and political maneuvering (in which he received an education by fire) determined a lot about the funding, staffing, and even the direction of research about Europa.

*Neuroscience in Space*, by Gilles Clément and Millard F. Reschke (Springer, August 2008). This book offers an overview of neuroscience research performed in space, from the observations made during the first piloted spaceflights to the detailed

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*Other New Aerospace History Publications (continued)*

scientific investigations currently being carried out aboard the International Space Station. This book is for the general scientific reader. Each project and the reason why it was done is described and accompanied by illustrations, rationale and hypothesis, and a summary of results. Also, reference lists guide readers to the published papers resulting from the various experiments. This book is a legacy of what we have learned on brain mechanisms and functions through research done in space, as well as a guide for what could be investigated in the future.

*Surviving 1000 Centuries: Can We Do It?* by Roger-Maurice Bonnet and Lodewyk Woltjer (Springer-Praxis, August 2008). The long-term future of our planet will be shaped by what is physically possible and what is not. This full-color book provides a quantitative view of our civilization over the next 100,000 years, in comparison to the 40,000–60,000 years it took for modern humans to emerge from Africa, on the basis of contemporary scientific and technological knowledge. The evolution of Earth's atmosphere and the origin of water are highlighted as the most important factors for the emergence and development of life. The authors consider both cosmic and natural hazards and point out that scientific information provided by satellites and communication systems on the ground could prevent many unnecessary casualties if used in forward planning and the installation of elementary precautions. Earth's evolving climate is considered; the authors show how greenhouse gases have played an important role in the climate of the past, whereas human industrial and agricultural emissions will greatly impact the climate of our future.

*The Martian Surface: Composition, Mineralogy and Physical Properties*, edited by Jim Bell (Cambridge University Press, July 2008). Phenomenal new observations from Earth-based telescopes and Mars-based orbiters, landers, and rovers have dramatically advanced our understanding of the past environments on Mars. This is an important new overview of the compositional and mineralogical properties of Mars; the last major study was published in 1992.

*Historical Dictionary of Aviation: From Earliest Times to the Present Day*, by David Wragg (U.K.: The History Press, August 2008). International in scope, this dictionary has over 4,000 entries covering all aspects of aviation terminology, past and present. It defines terms specific to both military and civil aviation and includes proper names of civil and military aircraft, airlines, air forces, manufacturers, and periodicals.

*Super Structures in Space: From Satellites to Space Stations: A Guide to What's Out There*, by Michael H. Gorn (Merrell Publishers, September 2008). Since the launch of Sputnik I in 1957, hundreds of spacecraft—from satellites and probes to space stations—have ventured beyond Earth's atmosphere to orbit the globe, fly to other planets, peer into the depths of the universe, or encounter comets and asteroids. Many have become household names, their missions the focus of popular attention, while others undertake their equally important tasks in relative anonymity. *Super Structures in Space* is the first book to present pictorially the most important of these humanmade objects. Featuring a wealth of breathtaking illustrations, this remarkable volume reveals the exciting story behind each selected spacecraft: its origins and development, its designers and manufacturers, and its launch and objectives.

*NASA Art: 50 Years of Exploration*, by James Dean and Bertram Ulrich (Abrams, October 2008). Artists, like astronauts, are constantly probing into the unknown. It is fitting that, shortly after the establishment of NASA in 1958, the NASA Art

Program was created on the principle that artists are uniquely equipped to interpret and document the experience of space exploration. *NASA Art* celebrates the 50th anniversary of NASA in October 2008 with an expanded selection of the best work created for the NASA Art Program, and it stands as a lasting record of the impact of space exploration on the artistic imagination.

*The Saturn V F-1 Engine: Powering Apollo into History*, by Anthony Young (Springer-Praxis, September 2008). The book focuses on the design, testing, and manufacture of the F-1 engine but also covers its incorporation into the first stage of the Saturn V and its in-flight record. It concludes with an examination of what might have been if the F-1 had not been discarded, together with the Saturn V, at the conclusion of the Apollo program.

*Images of America: Consolidated Aircraft Corporation*, by Katrina Pescador and Mark Aldrich, San Diego Air and Space Museum (Arcadia Publishing, September 2008). Founded by Reuben H. Fleet in 1923, Consolidated Aircraft Corporation (later Convair) became one of the most significant aircraft manufacturers in American history. For roughly 60 years, this prolific company was synonymous with San Diego. In fact, whole sections of the city were designed to provide homes for the Convair workers and their families. These men and women were responsible for building some of the most significant aircraft in aviation history, including the PBY Catalina, B-24 Liberator, and F-102 Delta Dagger, as well as the reliable Atlas missile, which was vital in launching America into space.

*Interplanetary—A History of the British Interplanetary Society*, edited by Bob Parkinson (London: British Interplanetary Society, September 2008). This volume combines a number of accounts, written from the perspectives of their various authors and influenced by their involvement with the British Interplanetary Society, into a single history of the Society. Other histories could have been written from different perspectives, perhaps by commentators who have no intimate links with the Society at all. What distinguishes the accounts contained in this book is the proximity of their authors to the events in question. In this respect, the book bears unique witness to the Society, its evolution, and its achievements over 75 years.

*A Passion for Mars: Intrepid Explorers of the Red Planet*, by Andrew Chaikin (Abrams, October 2008). The quest for Mars is chronicled by bestselling author Andrew Chaikin in this story of a passionate band of Earthbound explorers caught in the irresistible pull of the Red Planet. Based on extensive interviews, illustrated with compelling images, and animated by the author's own passion, Chaikin's account will resonate with anyone who has ever dreamed of a journey to Mars.

*The Extraterrestrial Life Debate, Antiquity to 1915: A Source Book*, edited by Michael J. Crowe (University of Notre Dame Press, October 2008). This book presents key documents from the pre-1915 history of the extraterrestrial life debate. Introductions and commentaries accompany each source document, some of which are published here for the first time or in a new translation. Authors included are Aristotle, Lucretius, Aquinas, Nicholas of Cusa, Galileo, Kepler, Pascal, Fontenelle, Huygens, Newton, Pope, Voltaire, Kant, Paine, Chalmers, Darwin, Wallace, Dostoevski, Lowell, and Antoniadi, among others. Michael J. Crowe has compiled an extensive bibliography not available in other sources. These materials reveal that the extraterrestrial life debate, rather than being a relatively modern phenomenon, has extended throughout nearly all of Western history and has involved many of its leading intel-

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*Other New Aerospace History Publications (continued)*

lectuals. The readings also demonstrate that belief in extraterrestrial life has had major effects on science and society and that metaphysical and religious views have permeated the debate throughout much of its history.

*Spying from Space: Constructing America's Satellite Command and Control Systems*, Centennial of Flight Series, by David Christopher Arnold (Texas A&M University Press, April 2008). On 14 August 1960, a revolution quietly occurred in the reconnaissance capabilities of America when the Air Force C-119 Flying Boxcar Pelican 9 caught a bucket returning from space with film from a satellite. This revolution in military intelligence could not have occurred without the development of the command and control systems that made the space race possible. In *Spying from Space*, David Christopher Arnold tells the story of how military officers and civilian contractors built the Air Force Satellite Control Facility (AFSCF) to support the National Reconnaissance Program. *Spying from Space* fills a gap in space history by telling the story of the command and control systems that make rockets and satellites useful.

*Hubble: Imaging Space and Time*, by David Devorkin and Robert Smith (National Geographic, September 2008). In the spirit of National Geographic's top-selling *Orbit*, this large-format, full-color volume stands alone in revealing more than 200 of the most spectacular images from the Hubble Space Telescope during its lifetime, up to the very eve of the final Shuttle mission to the telescope in 2008. Written by two of the world's foremost authorities on space history, *Hubble: Imaging Space and Time* illuminates the solar system's workings, the expansion of the universe, the birth and death of stars, the formation of planetary nebulae, the dynamics of galaxies, and the mysterious force known as "dark energy."

*Atmospheric Science at NASA: A History*, *New Series in NASA History*, by Erik M. Conway (The Johns Hopkins University Press, November 2008). This book offers an informed and revealing account of NASA's involvement in the scientific understanding of Earth's atmosphere. Erik M. Conway chronicles the history of atmospheric science at NASA, tracing the story from its beginnings in 1958, the International Geophysical Year, through to the present, focusing on NASA's programs and research in meteorology, stratospheric ozone depletion, and planetary climates and global warming. But the story is not only a scientific one. NASA's researchers operated within an often politically contentious environment. *Atmospheric Science at NASA* critically examines this politically controversial science, dissecting the often convoluted roles, motives, and relationships of the various institutional actors involved—among them NASA, congressional appropriation committees, government weather and climate bureaus, and the military.

## EMPLOYMENT OPPORTUNITY

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Publisher needs freelance and volunteer abstracters for online historical databases. Degree in history or closely related field preferred. Fluent reading ability in foreign language a plus. Join historians around the world abstracting journal articles for America: History and Life (AHL) and Historical Abstracts (HA). Our list of periodicals includes over 1,700 journals in over 40 languages. We rely upon the scholarly contributions of volunteer abstracters, who are allowed to select journals from a

list of available periodicals and may keep each issue they abstract. Volunteers are also eligible to receive a year's complimentary subscription to either AHL or HA. Abstracting for these bibliographies includes you in the largest history database in the world. It is good for your mind—and for the history profession. Paid freelance abstracters are paid per article, with a higher rate for foreign languages. Please e-mail [MMaxwell@abc-clio.com](mailto:MMaxwell@abc-clio.com) to become a volunteer abstracter; e-mail [VSchultheis@abc-clio.com](mailto:VSchultheis@abc-clio.com) for information about paid abstracter positions.

## NASA'S NATIONAL HISTORIC LANDMARKS

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*The National Park Service (NPS) manages the National Register of Historic Places (NRHP): over 80,000 buildings, districts, structures, and objects with historic significance. Of these, approximately 2,900 are National Historic Landmarks (NHLs) with historic significance to all Americans. Although NASA's accomplishments in aeronautical research, science, and space exploration are well documented, less is known about the historic buildings and structures that support and enable these accomplishments. This series provides an overview of NASA's 20 NHLs. This issue features NASA's Spacecraft Propulsion Research Facility, managed by Glenn Research Center (GRC), Ohio.*

### From Centaur to Constellation: The Spacecraft Propulsion Research Facility (B-2 Site)

#### **NASA's Plum Brook Station, Sandusky, Ohio**

On 2 January 1970, the front-page headline of *Lewis News*, the newsletter of Lewis Research Center (later renamed Glenn Research Center), Cleveland, Ohio, read, "First Test for New Facility, Centaur 'Hot Fires' in B-2." The article celebrates the successful hot firing of Centaur's twin rocket engines (RL-10s) on 18 December 1969 in the Spacecraft Propulsion Research Facility, commonly known by its site designation of B-2. Preparation for the firing began on 17 December with the "spin-up" testing of facility instrumentation. This testing involved the loading of liquid hydrogen and nitrogen in the propellant tanks, beginning automatic sequencing events. The propellant system was then reconfigured, and liquid oxygen replaced the liquid nitrogen in the rockets. Glen Hennings was chief of the Rocket Systems Division at Plum Brook Station at the time. Although he reported that a timing circuit failed, resulting in the shortening of the planned test period, the test and facility operations were successful. The test was the first of a series used to improve the rocket's pressurization and propellant feed systems and provided performance information for hydrogen-oxygen propellant systems in general.

Construction of the \$11.5 million facility, designed by NASA, began with the contract awarded to Bechtel Corporation on 30 June 1964. Within a year, the enormous 180-foot-deep hole for the vacuum chamber was excavated. Construction of the B-2 site was completed in 1969; the first checkout test was conducted on 21 October 1969. To support future tests, the central control room has been upgraded with modern computer control systems.

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*NASA's National Historic Landmarks (continued)*

Construction of the B-2 site required the excavation of a 180-foot-deep hole, pictured here in 1965. (Source: Glenn Research Center, file photo number 01264)

Although GRC had already expanded its original aeronautics capabilities and was directly supporting NASA's space missions, construction of the B-2 site and the Space Power Facility (constructed at the same time) expanded GRC's contribution to space exploration. The B-2 site directly contributed to the success of the U.S. space program, earning it the designation of a National Historic Landmark in 1985. The B-2 test facility was nominated to the National Register of Historic Places as part of the Man-in-Space NHL Theme Study conducted by the National Park Service. It was one of three sites grouped as Rocket Engine Development Facilities. Along with the Rocket Engine Test Facility and the Zero-Gravity Research Facility, the nomination states that these sites represent the "important role of the Lewis Research Center in developing hydrogen as a fuel for Centaur and Saturn V rockets."

Managed by the Glenn Research Center in Cleveland, Ohio, the B-2 site is located at Plum Brook Station in Sandusky, Ohio. The major elements that support this facility are a test building, the remote control room, an equipment building, a three-stage exhaust system, a waste treatment retention pond, a propellant oxidizer and fuel storage area, an electrical substation, a refrigeration system, and a service building. Although the successful operation

of the B-2 site is dependent on these support structures, the boundary of the Spacecraft Propulsion Test Building officially marks the NHL. The Spacecraft Propulsion Test Building is more than 70 feet high and extends 176 feet below grade. The vacuum chamber is a stainless steel cylinder that can accommodate space vehicles up to

22 feet in diameter and 50 feet high. It is capable of providing research, development, and validation testing of rocket engines. It was originally designed to handle engines capable of producing up to 100,000 pounds of thrust fired for either single- or multiple-burn missions, utilizing either cryogenic or stored fuels or oxidizers.

The NHL nomination lists the B-2 vacuum chamber as a structure contributing to space exploration, transportation, and education; the nomination states, "The successful development and use of the Centaur was due in large measure to data that was collected from successful test firings of Centaur engines in the facility." Designed to launch satellite payloads into orbital altitudes and give interplanetary space probes escape



Visitors receive a rare glimpse inside the B-2 vacuum chamber in May 2008, the first time the facility had been opened to the public since 1999. (Source: Glenn Research Center, file photo number 01245)

velocity, the Centaur served as the upper stage for successful launches of Atlas and Titan rockets carrying the Pioneer, Viking, and Voyager spacecraft to their rich scientific discoveries. The Centaur was also used in the Mariner, Surveyor, and Apollo programs. After contributing to Centaur testing, the B-2 site was placed on standby from 1974 to 1987. Thus, when the B-2 test building was designated as an NHL in 1985, it was only 16 years old and inactive. However, it was reactivated in October 1987 and supported flight hardware tests for the Defense Nuclear Agency's Spear and Exceed Programs up until 1992. In 1998, the Boeing Delta 3, which is a more powerful second stage than the original Centaur rocket, went through a full suite of tests.

The B-2 is currently the fourth largest vacuum chamber in the world. It is the only facility in the world capable of testing full-scale upper stage launch vehicles and rocket engines under simulated conditions at an orbital altitude of 100 miles. It simulates the conditions of the upper atmosphere by allowing rocket engines to be fired in a vacuum. The chamber simulates the extremely low temperatures (-320°F) of space with its liquid-nitrogen cold wall and the solar heat loads of space with quartz infrared lamps (130 watts per square foot). The B-2 site is used to verify start-at-altitude capabilities while subjecting test subjects to these conditions.

The uniqueness of the B-2 site is the capability to “hot fire” an engine after exposing it to the cold temperatures of space while maintaining a vacuum. The exhaust gas from the engine burn causes pressure to build up during a test. To vent this exhaust, an 11-foot-diameter valve opens in 0.4 second to connect the chamber to a steam ejector system, thus enabling the chamber to maintain its vacuum. Two parallel steam ejectors remove the engine exhaust products from the chamber while maintaining a moderate vacuum level. The rocket exhaust must also be cooled. The exhaust system includes a 250,000-gallon-per-minute water spray system for cooling the rocket exhaust. The below-grade spray chamber is 67 feet in diameter by 119 feet high. The spray system water is recirculated through the 1.75-million-gallon catch basin under the chamber. A 2.5-million-gallon retention pond is also located on-site.

Though the station's steam supply needs to be refurbished, the B-2's vacuum tank could be available for tests conducted in 2009. GRC is hopeful that the B-2 site will be used to support the upcoming Constellation Program. Pending the results of an ongoing trade study, the B-2 site may be selected to provide verification of start-at-altitude testing for launch vehicles supporting the lunar program, e.g., Ares V, and possibly to support testing associated with the Lunar Lander. If Constellation does use the B-2 site, consultation with the Ohio State Historic Preservation Officer (SHPO), National Park Service, and Advisory Council of Historic Places (ACHP) would be triggered if major modifications to the test building would be



An unidentified man stands beside the open B-2 vacuum chamber in 1987. (Source: Glenn Research Center, file photo number 02667)

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*NASA's National Historic Landmarks (continued)*

Aerial view of the Spacecraft Propulsion Research Facility, October 1999. (Source: Glenn Research Center, file photo number 02306b)

required. As explained by Les Main, GRC Historic Preservation Officer, these agencies understand and support NASA's reuse of our specialized facilities. The consultation process is required under the National Historic Preservation Act and is governed by an Agency-wide Programmatic Agreement executed in 1989. The consultation provides a means to ensure that unique engineering and architectural features of the B-2 test building are documented before they are altered or removed. It is a valuable exercise for a resource with limited public visibility. Documentation also provides a means of maintaining records of historic systems for future study by space system engineers and architects.

*Information for this article was provided by Robert Arrighi, archivist, and Daryl Edwards, aerospace engineer at Glenn Research Center, as well as the National Park Service NHL Web site, <http://www.nps.gov>. For additional information, contact Les Main, GRC Historic Preservation Officer, at [Leslie.A.Main@nasa.gov](mailto:Leslie.A.Main@nasa.gov) or Tina Norwood, NASA's Federal Preservation Officer, at [tnorwood@hq.nasa.gov](mailto:tnorwood@hq.nasa.gov).*

## OTHER AEROSPACE HISTORY NEWS

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### News from the National Air and Space Museum (NASM)

David DeVorkin (Space History Division) has published *Hubble: Imaging Space and Time* (Washington, DC: National Geographic Society [NGS], 2008), coauthored with Robert Smith and Elizabeth Kessler. It is an enlarged and expanded version of *The Hubble Space Telescope: New Views of the Universe* (NGS, 2004). On 29 September, he presented "In the Grip of the Big Telescope Age" at the conference "400 Years of the Telescope" at the European Space Agency center in Noordwijk, Holland. On 8 October, he was the Smithsonian Secretary's Distinguished Research Lecturer and spoke on "Death and Transfiguration: The Smithsonian and Institutional Change in American Astronomy" at the National Museum of Natural History.

Martin Collins (Space History) was co-organizer of the "Artefacts Conference," which was held from 5 to 7 October at the Smithsonian Institution in Washington, DC. Artefacts is an international consortium of museums and professionals whose purpose is to promote the use of objects in studies of the history of science and technology. This year's annual meeting focused on the theme of relations among science, technology, and art.

Roger Launius (Space History) may have set a new record in presenting *six* papers at one conference, the “59th International Astronautical Congress,” held in Glasgow, Scotland, 29 September–3 October 2008: “An Historical Overview of Robots Versus Humans in Spaceflight: Technology, Human Evolution, and Interplanetary Travel,” “An Unintended Consequence of the IGY: Eisenhower, Sputnik, and the Founding of NASA,” “Powering Space Exploration in the United States: A History of RTGs, Nuclear Reactors, and Outer Planetary Probes,” “Managing the Unmanageable: Apollo, Space Age Management, and American Social Problems,” “Why Go to the Moon? The Many Faces of Lunar Policy,” and “Vicarious Exploration, Apollo Imagery, and the Communication of American Culture.”

Paul Ceruzzi (Space History) chaired and moderated a discussion panel on “The Museum of the Future, a Roundtable Discussion” at the Society for History of Technology Annual Meeting in Lisbon, Portugal, which was held 11–14 October 2008. At the same meeting, Martin Collins was the organizer and presenter in the session “History of Technology and Journals: What’s Needed?” and chair of the session “Politics of Broadcasting.” Michael Neufeld (Chair, Space History) chaired the sessions “Touching Space: Images and Artifacts in the History of Space Exploration” and “Aviation Myth Reconsidered.” Jeremy Kinney (Aeronautics) acted as commentator in the latter session and was co-organizer of and presenter in the session “Beyond ‘Aviation History in the Wider View’—New Approaches of the History of Flight.”

Valerie Neal (Space History) presented a paper on “Dollars, Sense, and Human Spaceflight” at a conference on “The Almighty Dollar” held by the Austrian American Studies Association, 24–26 October 2008.

Allan Needell (Space History) has taken over the longstanding “Historical Seminar on Contemporary Science and Technology” (better known as the “Thursday Seminar” or the “NASM CHS”) from Michael Neufeld. Beginning in October 2008, it will reconvene under a new name, “The Smithsonian Contemporary History Colloquium,” with a slightly altered focus and, we hope, with an expanded audience of Smithsonian and neighboring scholars. Each quarter, we intend to focus on a specific theme pertaining to historical and cultural change. By change, we mean to include not only changes in science and technology, along with their social and political ramifications, but also—more broadly—related social, economic, and cultural changes in American society and its relations with the rest of the world. The first quarter (23 October, 20 November, and 18 December) will feature presentations on the changing nature of American proposals for ballistic missile defense, economic expertise in the Eisenhower administration, and the rise and fall of American Russian experts. Announcements with speakers, titles, and abstracts will be available in October. To be placed on the mailing list, send a request and brief biographical statement to [needella@si.edu](mailto:needella@si.edu).

## News from the American Astronautical Society (AAS)

The AAS History Committee will host its annual meeting on 19 November in conjunction with the “AAS National Conference” at the Pasadena Hilton in Pasadena, California. The meeting is scheduled for 1:30 to 3:30 p.m. Pacific time. Visitors are welcome to attend.

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*Other Aerospace History News (continued)*

The AAS History Committee is pleased to announce the selection of Michael J. Neufeld as the recipient of the 2007 Emme Award for Astronautical Literature for *Von Braun: Dreamer of Space, Engineer of War*.

After many years of service as series editor for the International Academy of Astronautics (IAA) History Symposia, Dr. Don Elder has decided to step down. We thank Dr. Elder for his efforts—along with those of volume editors, authors, and the publisher, Univelt—to bring each set of proceedings to publication, and we wish him well on his future endeavors. We would also like to take this opportunity to welcome his successor, Dr. Rick Sturdevant, as the new series editor.

## CALLS FOR PAPERS

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### SHFG 2009 Annual Conference

The Society for History in the Federal Government (SHFG) is now accepting proposals for individual papers or panels for our 30th-anniversary annual meeting, which will take place on Thursday, 19 March 2009, at the National Archives and Records Administration (Archives II), 8601 Adelphi Road, College Park, Maryland. Proposals on any aspect of federal government history and history practice will be considered and are encouraged, and we also invite proposals relating to the theme of “Thirty Years Young: Meeting New and Future Challenges and Opportunities in Federal History.” SHFG welcomes submissions from historians, archivists, librarians, curators, graduate students, and others engaged in the study of federal government history, regardless of whether they are federal employees. The deadline for proposals is 1 December 2008. Please mail proposals to 2009 Program Committee, Society for History in the Federal Government, Box 14139, Benjamin Franklin Station, Washington, DC 20044, or contact the program committee by e-mail at [mreis@historyassociates.com](mailto:mreis@historyassociates.com). You can also check the SHFG Web site for information on the conference at <http://www.shfg.org/>.

### SHFG Online Journal

The Society seeks papers for its new online, peer-reviewed history journal to be published in fall 2008. The journal will promote scholarship on all aspects of the history and workings of the federal government and of the developmental relationships between American society and the U.S. military or U.S. government, 1776 to the present. In addition, the journal will feature research articles on methodological developments in federal historical work, including the fields of history, archival science, historic preservation, public history, museum studies, Web-based history, memory studies, and other related areas. Manuscripts must be fully documented and follow the submission standards posted at our Publications link at <http://www.shfg.org/>. Send your manuscript, an abstract, brief biographical information, and information on available images to [editor-shfg-journal@shfg.org](mailto:editor-shfg-journal@shfg.org) or by mail to Society for History in the Federal Government, Box 14139, Benjamin Franklin Station, Washington, DC 20044. More information is available at <http://www.shfg.org/>.

## UPCOMING MEETINGS

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2–5 January 2009, the annual meeting of the American Historical Association will be held in New York City with events scheduled in the Hilton New York (headquarters) and Sheraton New York (coheadquarters). The theme of the meeting will be “Globalizing Historiography.” Please see <http://www.historians.org/annual/2009/index.cfm> for more details.

4–8 January 2009, the first 2009 semiannual meeting of the American Astronomical Society will be held in Long Beach, California. Please see [http://laas.org/meetings/meetings\\_future.php](http://laas.org/meetings/meetings_future.php) for more details.

10–12 March 2009, the American Astronautical Society’s 2009 “Robert H. Goddard Memorial Symposium” will be held in Greenbelt, Maryland. Please see <http://www.astronautical.org/goddard/> for more details.

26–29 March 2009, the annual meeting of the Organization of American Historians will be held in Seattle, Washington, at the Seattle Sheraton Hotel and the Washington State Convention Center. Please see <http://www.oah.org/meetings/2009/> for more details.

7–11 June 2009, the second 2009 semiannual meeting of the American Astronomical Society will be held in Pasadena, California. Please see [http://laas.org/meetings/meetings\\_future.php](http://laas.org/meetings/meetings_future.php) for more details.

11–16 August 2009, the annual meeting of the Society of American Archivists will be held in Austin, Texas, at the Austin Hilton. Please see <http://www.archivists.org/conference/index.asp> for more details.

15–19 October 2009, the annual meeting of the Society for the History of Technology will be held in Pittsburgh, Pennsylvania. Please see [http://www.historyoftechnology.org/annual\\_meeting.html#future\\_mtgs](http://www.historyoftechnology.org/annual_meeting.html#future_mtgs) for more details.

18–22 November 2009, the annual meeting of the History of Science Society will be held in Phoenix, Arizona. Please see <http://www.hssonline.org/> for more details.

19 November 2009, the American Astronautical Society History Committee will host its annual meeting in conjunction with the AAS National Conference at the Pasadena Hilton in Pasadena, California. Please see <http://www.astronautical.org/events/> for more details.

## OBITUARY

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Israel Taback, 88, passed away on Saturday, 30 August 2008. In 1942, Taback joined the Langley Aeronautical Laboratory of the National Advisory Committee for Aeronautics (NACA), which became the Langley Research Center of NASA. During his 35 years there, he designed instrumentation for the X-15 aircraft and directed the design of a Navigational and Guidance Research Laboratory. He was also Spacecraft Systems Manager of the Lunar Orbiter Project and was Deputy Program

*continued on next page*

*Obituary (continued)*

Manager for the Viking Program. After retiring from NASA, he joined Bionetics Corporation and continued to work for many years as an aerospace consultant. He received a number of special awards and honors, including the NASA Exceptional Scientific Achievement Medal, the NASA Exceptional Service Medal, and the NASA Outstanding Leadership Medal. He also was awarded an honorary science Ph.D. from Old Dominion University. Mr. Taback is survived by his son, Max Taback; his daughter and son-in-law, Ann and Bernard Pasquier; his granddaughter, Wendy A. Fairman; and his siblings, Leonard Taback, Sara Gantwarg, and Vivian Shlisky Taback, along with their families.

## NASA'S FIRST 50 YEARS: A HISTORICAL PERSPECTIVE CONFERENCE IMAGES

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Photos from the Conference Held at NASA Headquarters,  
28–29 October 2008



NASA Chief Historian Steven Dick launches the 50th-anniversary conference as he introduces Administrator Michael Griffin to deliver opening remarks. (Source: NASA/Paul Alers)



NASA's 11th Administrator, Michael Griffin, opens the conference with his thoughts on NASA at 50. (Source: NASA/Paul Alers)



Howard McCurdy, a professor at American University in Washington, DC, offers a look inside NASA at 50. (Source: NASA/Paul Alers)



Professor John Logsdon of George Washington University chronicles the problems and achievements of 50 years of human spaceflight. (Source: NASA/Paul Alers)



Mike Neufeld, Chair of the Space History Division at the National Air and Space Museum, discusses the "Von Braun Paradigm" at the 50th-anniversary conference. (Source: NASA/Paul Alers)

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*Conference on NASA's First 50 Years (continued)*



Award-winning biographer and historian Laurence Bergreen discusses voyages to Mars on the second day of the 50th-anniversary conference. (Source: NASA/Paul Alers)



A group photograph of the conference speakers, who addressed a wide range of topics from international relations in space to planetary science and aeronautics. From left to right are John Krige, Maura Mackowski, Michael Neufeld, Edward Goldstein, Michael Meltzer, Joseph Tatarewicz, Stephen Johnson, Andrew Butrica, Steven Dick, Linda Billings, Richard Hallion, J. D. Hunley, Anthony Springer, Robert Ferguson, Erik Conway, David DeVorkin, Jennifer Ross-Nazzal, and James Fleming. (Source: NASA/Paul Alers)

## NASA'S 50TH ANNIVERSARY GALA IMAGES

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Photos from the Gala Held at the NASM's Udvar-Hazy Center,  
24 September 2008



Neil Armstrong—astronaut, professor, United States naval aviator, and first human on the Moon—addresses guests at the celebration. (Source: NASA/Bill Ingalls)



Grammy Award-winning producer Quincy Jones (center) presents a platinum copy of “Fly Me to the Moon” to Senator John Glenn (left) and Apollo 11 commander Neil Armstrong (right) during NASA’s 50th-anniversary gala. The plaques thank the astronauts for helping to boost sales of the song’s album, *It Might As Well Be Swing*. (Source: NASA/Bill Ingalls)

*continued on next page*

*NASA's 50th Anniversary Gala Images (continued)*



Astronauts John Glenn (left) and Neil Armstrong (center) chat with Frank Sinatra, Jr. (right), before NASA's 50th-anniversary gala. (Source: NASA/Bill Ingalls)



NASA Administrator Michael Griffin (left) with Apollo 11 astronaut Neil Armstrong (right) and Dr. June Scobee Rogers, the founding chair of the Challenger Center for Space Science Education. (Source: NASA/Bill Ingalls)

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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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