



From the Chief Historian



During these first few months on the job, many people have asked me if there have been any big surprises. There have been a few, but the thing that has struck me the most is a very pleasant surprise. In meetings, conferences, and other day-to-day interactions, I've been astounded by the number of people I've met who have had some sort of positive interaction with the National Aeronautics and Space Administration's (NASA's) history program. An amazing number of historians, as well as people in other fields, have spent time working in our archives or with our materials, serving as interns at NASA early in their careers, or writing NASA histories; others have benefited from winning one of the fellowships sponsored by the NASA history program. While some of these folks are no longer working in the field of aerospace history, every one of them that I've talked with clearly remembers his or her connection to NASA history with great warmth and affection.

This is, of course, a testament to the superb people who have worked and are now working in our history program. But I think that it also says something about the enthusiasm and collegiality of those interested in aerospace history. This is an asset that I am committed to encouraging. So, whatever your connection to NASA history, you can count on a warm welcome here. And if you happen to be a former intern, fellow, researcher, or author and have been busy with other things—or if you know someone who fits these categories

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Quarterly Series: NASA's National Historic Landmarks

The National Park Service manages the National Register of Historic Places (NRHP). The NRHP contains approximately 2,900 National Historic Landmarks (NHLs); the buildings, districts, structures, and objects that are significant to America's history nationally. While NASA's historic accomplishments in aeronautical research, science, and space exploration are well documented, less is known about the buildings and structures that supported and enabled these accomplishments. This series provides an overview of NASA's 20 NHLs. This issue features NASA's Lunar Landing Research Facility located at Langley Research Center, Hampton, Virginia.

First Lunar, Then Crash, and Now Splash Landings—The Legacy of the Gantry Lives On

Lunar Landing Research Facility, Langley Research Center

By Caroline Diehl and Mary Gainer

Most people recognize the famous phrase spoken by Neil Armstrong as he stepped onto the Moon's surface, "That's one small step for [a] man,

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that won't see this newsletter—please drop me a note or call. You can always reach me at bill.barry@nasa.gov or at 202-358-0383. Let's keep in touch.

Until then, Godspeed.



William P. Barry
Chief Historian

Quarterly Series: NASA's National Historic Landmarks (continued)

one giant leap for mankind.” Lesser known is his response, upon returning to Earth, when asked what it felt like to land on the Moon: he replied, “Like Langley.” His response is a tribute to the tremendously important role that the Lunar Landing Research Facility (LLRF) played in the success of the Apollo program. The LLRF, more commonly known as “the Gantry,” is one of five NHLs located at Langley Research Center (LaRC) in Hampton, Virginia. In addition to describing the significant role that the LLRF played in the first lunar landing, this article describes the changing roles that the facility has played over the years in performing impact and crash landing research, as well as the facility’s newest capability, splash landings in the recently constructed Hydro Impact Basin.

When President John F. Kennedy made his announcement in 1961 that the United States would land a man on the Moon by the end of the decade, the task of implementing such an extremely ambitious goal fell to NASA. The Apollo mission planners were faced with the challenge of designing a set of flights that could meet the goal while minimizing risk to human life, cost, and demands on technology and astronaut skill. After evaluating several different strategies for a Moon landing, NASA eventually settled on the lunar orbit rendezvous (LOR) method, in which a single rocket would launch two spacecraft into lunar orbit. One would circle the Moon while the other descended to the lunar surface. The lander would then boost itself back into orbit, dock with the mother ship, and return to Earth.

The success of the LOR strategy ultimately depended on whether the astronauts could learn to safely land the Lunar Excursion Module (LEM) on the Moon’s surface and return into orbit to dock with the mother ship. A major obstacle in designing a training procedure, however, was that the trajectory of the LEM would be different from what it would be if lifting off from Earth because the gravitational attraction of the Moon is only 1/6 that of Earth. Thus, the problem became how to reproduce the operation of the LEM in a low-gravity environment. The solution was conceived by W. Hewitt Phillips, a Langley engineer who specialized in the guidance and control of aircraft. Phillips was responsible for devising the design of the LLRF, a training simulator that allowed NASA engineers to study the complex process of a lunar landing while giving the astronauts critical hands-on pilot training in the LEM.

The LLRF, which was first conceived as an Erector Set model in Phillips's home workshop, was constructed by C. W. Regan, Inc., in 1965 at a cost of \$3.5 million. Located in the northern portion of NASA LaRC, the most obvious feature of the LLRF was its enormous gantry, which became an unmistakable landmark on the horizon. The A-frame steel structure, measuring 400 feet long by 240 feet high, was composed of truss elements arranged with four sets of inclined legs that provided adequate clearance for any pendulous motion the vehicle might develop. An elevator shaft in the east end provided access to the overhead equipment while catwalks allowed the inspection of all structural areas.

The LLRF simulated lunar gravity through an overhead partial-suspension system that provided lifting force through cables acting through the LEM's center of gravity, counteracting all but 1/6 of Earth's gravitational force. Protected by automatic and manual braking equipment, the LEM could fly unobstructed within an area measuring approximately 360 feet long, 180 feet high, and 42 feet wide. The operation of the facility



A 1965 LEM suspended from the Gantry.

was directed from a control room located near the southwest corner of the gantry structure. From here, the movements of the LEM, bridge, and dolly could be viewed by the test director and facility operators through large observation windows. Two-way communications throughout the facility allowed the test director to maintain constant voice contact with the pilot and operational crews. Initially paved with a 30-foot-wide strip of concrete to minimize jet-blast effects and fuel spill releases, the base of the Gantry later was covered with fill dirt and modeled to simulate the lunar surface, complete with the holes, pits, and craters the astronauts would encounter on the Moon.

In addition to flight testing of the LEM, the LLRF also was used as a lunar walking simulator for the Apollo astronauts. This was accomplished by suspending the astronaut on his side with a system of slings and cables, allowing him to walk on a plane inclined to approximately 80.5 degrees relative to the vertical direction of Earth's gravity. Weightlessness and other gravitational conditions could be simulated by varying the inclination of the walkway.



A 1965 lunar walking simulator.

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Quarterly Series: NASA's National Historic Landmarks (continued)

While the first men to land on the Moon would undoubtedly rely on self-locomotion (walking), the LLRF was also used to test surface and flying vehicles for lunar exploration. Built by the Bell Aerosystems Company in 1967, a small, one-man, rocket-powered flying device was flight-tested at the Gantry to investigate the feasibility of the vehicle control concept, the piloting differences between Earth and lunar gravity, and the impact of pressure suits on vehicle handling qualities. Since a portion of testing the vehicle involved investi-



A 1967 POGO flying vehicle test.

gating instability and vibrations, the flying device was referred to as “POGO,” after the jumping stick. Under simulated lunar gravity conditions, the pilot stood on the simple, open vehicle frame and controlled the two gimbaled nozzles of 90 percent liquid hydrogen peroxide propellant by twisting handgrips to maneuver and direct the POGO. Two pilots who had previously flown the vehicle under Earth-gravity conditions found that it was easier to fly in simulated lunar gravity than Earth gravity, and use of spacesuits presented no serious problems.

From 1965 until the end of the Apollo program in 1972, the LLRF was used to train 24 astronauts for lunar missions, including Neil A. Armstrong and Edwin E. “Buzz” Aldrin, Jr., of Apollo 11. Although the end of piloted lunar missions made the Gantry unneeded by the early 1970s, NASA quickly contrived a new use for this unique facility, converting it into a full-scale crash test facility for general aviation aircraft. Redesignated as the Impact Dynamics Research Facility (IDRF), it was designed to obtain data on the structural response of aircraft, and the forces transmitted to the occupants, during a crash impact. The full-scale crash tests would help evaluate crashworthy design concepts both for aircraft structure and for seat and restraint systems.

The first full-scale crash test at the new IDRF was conducted in February 1974. These tests took advantage of the large dimensions of the gantry structure, using a “pendulum-swing” technique in which aircraft were placed in harnesses, raised to the desired height and pullback position, and released. One of the most important features of the facility was its



Full-scale impact testing in 1979.

ability to conduct full-scale crash tests of light aircraft and rotorcraft under free-flight conditions, allowing the test staff control over the altitude and velocity of test craft on impact. From 1974 to 2003, the IDRf was used to conduct 41 full-scale crash tests of general aviation aircraft, including landmark studies to establish baseline crash performance data for metal and composite aircraft; 11 full-scale crash tests of civilian helicopters; 48 qualification tests of Army helicopters; 3 vertical drop tests of Boeing 707 transport aircraft fuselage sections; and 60 to 70 drop tests of the F-111 Aardvark. In addition, the IDRf aided in numerous component tests in support of the Mars Sample Return Earth Entry Vehicle program, as well as other unique experiments including a tether-hover test of the XFV-12A, vertical drop tests of CH-47 Chinook helicopter fuselage sections containing artillery projectiles, and drop tests of an energy-absorbing pallet for the deployment of a remote-controlled vehicle.

The final U.S. Department of Defense–sponsored full-scale crash tests at the IDRf were conducted in 1999. Full-scale crash and drop tests of civilian aircraft continued until 2003 with support from the Accident Mitigation Element of the NASA Aviation Safety Program. With no foreseen future mission need for the IDRf and with limited funding for the maintenance and upkeep of such a large structure, NASA closed the facility in 2003, and it was placed on the list of buildings and structures planned for demolition at LaRC. As luck would have it, with President George W. Bush’s announcement in 2004 of the Vision for Space Exploration, NASA determined that the IDRf could be adaptively reused to support the Agency’s new Constellation Program.

The facility was reopened in 2005 to conduct landing tests associated with the development of the Crew Exploration Vehicle (CEV) named Orion. Ironically, the testing would be remarkably similar to the original purpose of the LLRF—testing of the LEM. The facility was renamed the Landing Impact Research Facility (LandIR), and minor modifications were made to include the installation of a new parallel winch system to support full-scale Orion landing testing, as well as the replacement of an elevator. After careful study of the program and system elements required to satisfy the new space capsule’s landing system performance standards, NASA selected water landing as the primary spacecraft landing mode. As a result, a more significant modification involved the installation of a new Hydro Impact Basin (splashdown pool) located at the west end of the Gantry. Construction of the Hydro Impact Basin, which is 115 feet long, 90 feet wide, and 20 feet deep, was completed in December 2010. Although the Constellation Program was canceled by President Barack Obama, the Orion project plans to continue performing impact testing at the LandIR. Over the next several years, water impact tests will be performed as part of the appropriately named Structural Passive Landing Attenuation for Survivability of Human-crew (SPLASH), an Orion Crew Service Module Landing Systems project. Beginning in February 2011, the new Hydro Impact Basin will be commissioned through a series of swing tests performed using a Boilerplate Test Article (BTA) that was recently built at LaRC. Data from these BTA tests will be used to validate analytical models of the impact event. The next series of tests being planned will use the Orion Prime Contractor,

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Quarterly Series: NASA's National Historic Landmarks (continued)

Lockheed Martin's Ground Test Article (GTA). In addition to supporting the Orion SPLASH project in using the new water impact testing capability, the Gantry may also be utilized in the future by other commercial and government programs.

NASA's continued reuse of the Gantry is consistent with the goals established by Executive Order 13287, Preserve America, signed by President Bush in 2003, which reaffirms the federal government's responsibility to show leadership in preserving America's heritage by "actively advancing the protection, enhancement, and contemporary use of the historic properties owned by the Federal Government..." Perhaps more importantly, it is a testament to the ingenuity of the NASA engineers who continually find ways to utilize such a unique and significant Apollo asset to support current and future mission needs. The history of the Gantry, which spans more than 45 years, is available online at <http://crgis.ndc.nasa.gov/historic/1297>.



A 2011 aerial view of the Hydro Impact Basin.

For more information on this property, please contact Mary Gainer, LaRC Historic Preservation Officer, at mary.e.gainer@nasa.gov, or Caroline Diehl, CRM Support Contractor, Science Applications International Corporation (SAIC), at caroline.a.diehl@nasa.gov.

NASA Appoints New Federal Preservation Officer

Ms. Jennifer Groman joined NASA as the new Federal Preservation Officer on 18 January 2011. Prior to joining NASA, Groman served as the Deputy Federal Preservation Officer and Cultural Resources Program Manager for the U.S. Army, headquartered in Washington, DC. Groman held responsibility for a broad-ranging program including over 100 installations nationwide and overseas. She was responsible for policy development as well as identifying systemic issues requiring overarching programmatic approaches to compliance with the National Historic Preservation Act. Groman has strong familiarity with all laws pertaining to cultural resources management and has worked with a large variety of stakeholders to include the National Trust, the Advisory Council on



Ms. Jennifer Groman.

Historic Preservation (ACHP), the National Park Service (NPS), and numerous American Indian Tribes and Native Hawaiian Organizations.

Groman brings to the position her technical expertise in historic preservation and a strong understanding of the challenges associated with federal agency roles as stewards of the nation's physical reminders of our distant and not-so-distant past. She also brings her experience in complying with multiple accountability regulations with respect to heritage assets as well as her technical expertise as a Leadership in Energy and Environmental Design (LEED) accredited professional. Groman has been actively pursuing how to update historic structures to comply with new federal energy-efficiency mandates and how to account for historic properties in real property databases to meet federal accountability standards. She has more than 17 years' experience in the United States and abroad working complex issues and balancing competing interests such as public interest groups, heritage tourism, and the economic feasibility of retaining obsolete yet historic facilities. Her background includes working as a consulting architect for design projects, as a heritage officer and strategic planner for local government, as a liaison for the ACHP, as a historical architect with the Army's Chief of Staff for Installation Management, and most recently as a preservation officer for Army Headquarters.

Groman sits within NASA's Office of Strategic Infrastructure, Environmental Management Division. In managing the Agency Cultural Resource Management Program, she will support the Center Historic Preservation Officers and work closely with NASA historians and archivists, master planners, facility managers, and program and project managers, as well as the ACHP, NPS, and State and Tribal Historic Preservation Officers.

Groman has a Bachelor of Arts degree in architecture from Yale University and a Master of Architecture in design and a certificate in historic preservation from the University of Texas at Austin.

News from Headquarters and the Centers

Headquarters

Collectively, Colin Fries, John Hargenrader, and Liz Suckow share reference duties: answering inquiries received by e-mail, assisting researchers who visit in person, and helping the Chief Archivist with Freedom of Information Act (FOIA) requests. They recently worked as a team on a number of other projects as well. They scanned speeches of NASA Headquarters officials, Center Directors, and Program Managers and uploaded them into the database which is part of the Historical Reference Collection (HRC) and available online at <https://mira.hq.nasa.gov/history/>. They worked together to process a collection of press materials on Space Shuttle missions acquired from the Office of Communications newsroom. And their efforts

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News from Headquarters and the Centers (continued)

remain ongoing to preserve our hard-copy HRC by photocopying deteriorating news clippings, replacing worn folders, and then updating abstracts of folder contents. The current focus is on files containing information on astronomy, satellites, and space probes.

Colin completed the processing of several collections recently: material on the Search for Extraterrestrial Intelligence (SETI) received from former NASA Chief Historian Steven Dick, a collection of life sciences sources from contract author Maura Mackowski for her forthcoming book, and material on Space Station Freedom received from the former acting manager of the Utilization and Operations Office Mike Hawes. Also, Colin continues to assist in maintaining and updating the History Program Office's Web pages; he is focusing on reviewing new ePubs and adding them to the history publications Web page for downloading. He recently attended a U.S. Government Printing Office seminar on marketing publications; an astrobiology symposium in Crystal City, Virginia; and a preservation symposium at the Library of Congress.

John completed the processing of a small collection of Goddard Space Flight Center (GSFC) scientist James Acker's source files for his forthcoming book on oceanography. He continues to verify photo dates in the Great Images in NASA (GRIN) database to make sure they conform as closely as possible to the dates the photos were taken, after some errors were discovered in GRIN. Additionally, John appraised a collection of Center telephone directories, adding digital copies of missing issues to our electronic repository in the internal database.

Liz completed the appraisal of a 66-box collection borrowed from the Federal Records Center (FRC), photocopying valuable historical items from the files to add to the HRC. This large FRC collection contained Office of Manned Space Flight correspondence and files of Surveyor Program Manager Benjamin Milwitzky. Liz continues to update the Headquarters oral history inventory and also enter descriptive information about our oral histories into the internal database. Colin periodically uploads the latest version of the inventory to our Web site at <http://history.nasa.gov/oralhistory/ohcatalog.htm>. Liz has begun the appraisal of a 21-box collection borrowed from the FRC, which contains sources for an unpublished manuscript on Apollo program management.

Chief Archivist Jane Odom continues to evaluate and acquire new material for the HRC. Additionally, she appraises items for historical value, directs the subsequent processing of collections, answers reference requests, and currently spends a good deal of time on book and archival support contracting issues. This quarter, she worked to clear into the building several foreign nationals from different countries who visited the NASA History Program Office to conduct research. In celebration of Archives Month in October, Jane, Colin, and Liz attended an open house at the National Air and Space Museum (NASM) Archives, where they visited with colleagues, viewed exhibits, and learned of plans to move the archives to Chantilly, Virginia, where the Smithsonian NASM's Steven F. Udvar-Hazy Center is located.

Ames Research Center (ARC)

Atmosphere of Freedom: 70 Years at the NASA Ames Research Center (SP-2010-4314) by Ames historian Glenn Bugos is now available in print. It tells the history of Ames since 1958, with special attention to events over the past decade.

Members of the science and flight team of the Kuiper Airborne Observatory (KAO) relived the past as they opened a time capsule on 10 November 2010 at Ames. The KAO was a former Lockheed C-141 aircraft modified to carry a 36-inch infrared telescope and that flew for 21 years out of ARC. An entire generation of infrared astronomers trained on the KAO before it was retired in 1995 to free up funds for the Stratospheric Observatory for Infrared Astronomy (SOFIA) to succeed it. The time capsule was informal, just a flight box into which the crew contributed items to serve as remembrances of the KAO and as lessons learned for the future SOFIA crew. Plans were to open it upon the first science flight of SOFIA. Wendy Dolci organized the event, and Ed Erickson compiled a set of historical slides.



Wendy Dolci holds up two mascots from the Kuiper Airborne Observatory during the KAO time capsule opening festivities. The kiwi and koala were given to KAO crew by friends in New Zealand and Australia. The koala mascot flew about four million miles on the KAO.

The items reflected the camaraderie and unusual sense of humor that the KAO crew developed through much time spent together working, traveling, and inventing ingenious ways to deal with various technical problems and to fine-tune their science returns. One KAO team member sent a postcard to his future self: "If you got this postcard that means they finally got SOFIA flying." He hadn't anticipated how postage rates would rise over the years, so his postcard was hand-delivered by a friend. The NASA Ames History Office accessioned most of the items. Some items were presented to the next generation of infrared astronomers on SOFIA as their KAO ancestors wished them Godspeed before the first SOFIA science flight on 30 November 2010.

NASA is planning to return to the torrid surface of Venus, and that has kicked up interest in the only American explorer to land there. In December 1978, the small Day Probe of the Pioneer Venus mission survived its descent through the harsh atmosphere of Venus and transmitted data from the surface for an hour. NASA engineers refining a proposal for the 2016 NASA Surface and Atmosphere Geochemical Explorer (SAGE) mission to Venus are studying the electrical connections and antennas of the Pioneer probes to better understand their success. From the Pioneer Project papers at the NASA Ames History Office, we pulled

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22 cubic feet of records for review and delivered 2,393 pages of digital material to researchers.

Archival intern Ratana Ngaotheppitak prepared and encoded a finding aid to the *Amelia Reid NACA Human Computer Papers, 1945–1958* (PP09.16). April Gage prepared building locator maps for the Web site of the Ames Historic Properties Office. Page & Turnbull completed a Historic American Engineering Report on the 7- by 10-foot wind tunnel #2 (building N216).

Dryden Flight Research Center (DFRC)

With the completion of their recent books, Peter Merlin and Curtis Peebles have started two new projects.

Peter will research and write a manuscript about Unmanned Aerial Vehicle (UAV) mishaps and the lessons learned from such “events,” as they are often called. UAVs, as genuinely controllable machines, date to the First World War; they were in use at Dryden as early as the 1960s, and they have remained in use at the Center in varying ways ever since. UAVs come in all sizes, from low-budget radio-controlled models to subscale and full-scale research aircraft, including a Boeing 720. Dryden has built and flown its own UAVs and hosted industry partners who have come here to experiment themselves, all with varying degrees of success. UAVs have been crashing as long as they have been flying (sometimes even intentionally, as was the case for the Boeing 720), and with an increasing reliance on such aircraft as well as growing pressure for their introduction into the national airspace, this should be a timely work.

Curtis Peebles is setting out to write the first comprehensive study of intelligent flight control systems on aircraft. The concept originated as a joint project between Ames and Dryden as a self-repairing flight control system meant to make a damaged or disabled aircraft flyable by having an on-board computer manipulate the remaining control surfaces or engines to maintain stability. The program evolved into an intelligent flight control system in which the flight computer’s neural network is “adaptive”: it learns how to



This image, taken in 1984, shows the Controlled Impact Demonstration, in which a Boeing 720 was flown remotely by a Dryden pilot onto Rogers Dry Lake. Embedded spikes tore open the wing tanks to see if a substance called Anti-Misting Kerosene (AMK) mixed in with the fuel would prevent the fuel from atomizing and catching fire. The huge ball of fire settled that question.

reconfigure a damaged aircraft on the fly, as it were. NASA’s research has already spread to industry, but industry’s choice has been to rely on a “deterministic” flight control system wherein engineers anticipate all possible mishaps and program in the proper countermove to keep the plane flyable. Dryden continues research

in this field, and not simply because an adaptive system is far harder to master: adaptive systems hold the potential for increased fuel efficiency in cars (especially as systems age and fail) and for energy efficiency in buildings; output from power plants; and maybe even networks of distribution for power grids, communications systems, or water distribution systems.

Christian Gelzer has set himself two projects for this year, both to coincide with the end of the Space Shuttle program. The first is an edited oral history collection of people at Dryden who worked on the Shuttle program; interviewees will span the Shuttle's career. He anticipates the monograph to fall into the Spoken Word series in which Dryden has already released two volumes. The second project is an edited collection of essays by key personnel involved in the Shuttle program, highlighting aspects of Dryden's contributions. The chapters will cover subjects such as the Shuttle's approach and landing tests; the U.S. Air Force's role in accommodating the landings; the movement of the orbiters over land from Palmdale, California, to Dryden; what it was like for a Center to drop everything and respond to the Shuttle; and the preparation of the orbiters to be ferried to Florida (when the work was done by a local group). Christian will contribute at least one chapter and edit the manuscript.

Betty Love faithfully labors on with the archiving while contributing her knowledge and expertise to researchers and authors (most recently, for example, to Bertha Ryan, author of *Soaring Beyond the Clouds: Einar Enevoldson Reaches for 100,000 Feet*). In addition to digitizing some of the archive's searching resources for the Center's newsletter (*X-Press*), she continues to sort boxes of accessioned material. She is currently our only bulwark against inundation by new donations, not to mention our own gold mine of the Center's past.

Glenn Research Center (GRC)

On 19 November, a book signing and awards ceremony were held in celebration of Bob Arrighi's book, *Revolutionary Atmosphere: The Story of the Altitude Wind Tunnel and Space Power Chambers*. The new documentary DVD *A Tunnel through Time*, about the Altitude Wind Tunnel, was officially released at the event as well. Staff members who assisted in the editing of the book, the creation of the Altitude Wind Tunnel Web site, the official Historic American Building Survey and Historic American Engineering Record report, and the new DVD were presented with certificates in appreciation of their efforts. Special guest Dr. Woodrow Whitlow, NASA Associate Administrator for Mission Support, was in attendance. Les Main, Historic Preservation Officer at GRC, spoke on the importance of documenting our historic facilities, and Bob Arrighi spoke about the book and the history of the tunnel. Those in attendance had the opportunity to watch the documentary and get a signed copy of the book.



Bob Arrighi.

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News from Headquarters and the Centers (continued)

Another author and book were celebrated on 27 January when Mark Bowles was presented with the 2010 American Institute of Aeronautics and Astronautics (AIAA) Historical Manuscript Award for his book, *The Apollo of Aeronautics: NASA's Aircraft Energy Efficiency Program, 1973–1987*. Dr. Bowles gave a presentation and signed books at a local AIAA chapter meeting. This is his third AIAA Historical Manuscript Award.

Jet Propulsion Laboratory (JPL)

During the last few months, Erik Conway has slogged through a few hundred JPL documents from the 1960s-era Surveyor program. Surveyor ran from 1960 through 1968, and it ultimately landed five (of seven attempted) robotic landers on the Moon. Some of the Surveyor records were on paper, others on microfilm. JPL's records are rather scarce prior to 1965, perhaps reflecting one of the criticisms leveled at the program by an internal review in 1964, that neither JPL nor NASA leaders had paid enough attention to the program to keep it on track.

At Headquarters, a program manager named Benjamin Milwitzky was responsible for Surveyor. Milwitzky retained a large volume of material that was retired to the Suitland Federal Records Center after Surveyor closed down. Erik is currently seeking permission to visit the records center in the spring to fill in details about the first few years of the program's life.

Since his last report on the progress of the Mars exploration history, Erik completed the first round of internal review (answering his supervisor's comments) and started the second, getting comments from a number of JPL engineers and scientists involved in the Mars program. He has gotten excellent, and occasionally challenging, comments back from four of his chosen reviewers thus far and expects to receive many more in January.

The JPL Archives recently established a Mystery Photo Web site, which is available online at <https://beacon.jpl.nasa.gov/mystery-photo> and has been a big hit. Julie Cooper has been posting images on the Web site every month since September and inviting comments from JPLers, retirees, and the public. In the last two months, the Mystery Photo Web page received 1,400–1,600 hits resulting in many amusing and informative comments on the blog. Retirees have identified several people in the photos who had worked with them.

The entire combined Archives and Library collection of JPL telephone directories (136 of them, dating from 1959 to 2009) has been scanned and converted to PDF files. The scanning of the organization chart/personnel chart collection is in progress.

Johnson Space Center (JSC)

The NASA Johnson Space Center (JSC) History Office is working closely with the Agency's team coordinating the Historic American Engineering Record (HAER) for the Space Transportation System (STS).

The Houston team has completed oral history sessions with 20 individuals representing Marshall Space Flight Center (MSFC), JSC, and the North American/Rockwell/Boeing facilities in Downey and Palmdale, California. The audio-recorded interviews assist in documenting all phases of the Space Shuttle Program from concept development to retirement. The interviews focus on design, hardware evolution, and changes in response to the two Space Shuttle accidents.

The oral histories captured thus far reflect a wide array of topics including the development and testing of the external tank, the Space Shuttle main engines, the thermal protection system, the impact of *Challenger*, the redesigned solid rocket motors, and the retirement of the Shuttle fleet. An additional 10–20 oral histories will be collected during 2011. The transcripts are being posted online at the JSC History Portal (http://www11.jsc.nasa.gov/history/oral_histories/oral_histories.htm).

The individuals interviewed for this project were identified by the Agency's STS Recordation Team, which includes representatives from KSC, JSC, DFRC, MSFC, and NASA Headquarters; State Historic Preservation Officers from Texas, California, Florida, and Alabama; and employees of the National Park Service and the national Advisory Council on Historic Preservation.

Langley Research Center (LaRC)

NASA Langley's Transonic Dynamics Tunnel Celebrates 50 Years of Contributions

In October 2010, Langley celebrated the Transonic Dynamics Tunnel's (TDT) 50 years of contributions to aerospace with a reception for community leaders, retirees, and employees that included tours of the tunnel. The Aerospace Flutter Dynamics Council held its semiannual conference at Langley and joined in the celebration. Featured speakers at the reception included Hampton Council member Christopher Stuart and NASA Associate Administrator for Mission Support Woodrow Whitlow. Whitlow began his NASA career as a researcher in the TDT in 1979. Stuart's great-uncle, who also attended, is a National Advisory Committee for Aeronautics (NACA) retiree.

Soon after the TDT opened in early 1960, it was called upon to help solve a serious safety issue—what caused the wings of two Lockheed Electra turboprop commercial transport aircraft to snap off in flight. From that early first test to the present, the TDT has made significant contributions to understanding the aeroelastic characteristics of a variety of airplanes, helicopters, and space launch vehicles. Many of the airplane studies focused on flutter, which is a violent, often destructive vibration of a wing or tail surface.



Engineer Tom Brydsong checks the Apollo/Saturn 1B Ground-wind-loads model in the NASA Langley Transonic Dynamics Tunnel.

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Langley had studied flutter since the 1940s in small tunnels. As aircraft began to fly faster, researchers realized that a larger tunnel with sustained transonic capabilities was needed to gain a better understanding of the phenomenon. Langley engineer Arthur Regier had an idea for such a tunnel and carefully worked out a design. Regier's design was accepted, but then as now, Langley's budget for new construction was limited. A decision was made to decommission the 19-foot Pressure Tunnel and convert it into the TDT, using as much of the previous structure as possible.

The Electra test in the new TDT was an important one. Lockheed engineers brought a model of their new airplane to the tunnel. They and the TDT staff, with assistance from Boeing and Federal Aviation Administration (FAA) engineers, began to examine the flutter characteristics of the aircraft. The tests determined that destructive flutter began following damage to the beams that attached the engines to the wing. The flutter problem was solved by modifying the attachment beams.

From this initial success, the TDT staff has studied and resolved flutter and other aeroelastic issues in commercial and military aircraft. Spacecraft such as Apollo and its Saturn rocket, the Space Shuttle, and the Mars robotic explorers were also tested in the tunnel. With upgrades to test visualization and data recording, the TDT staff continues to make significant contributions to the understanding of aeroelasticity and to keep aircraft and spacecraft flying safely. Please visit online at <http://aeroelasticity.larc.nasa.gov/index.php/facilities/transonic-dynamics-tunnel/> for more information about LaRC's aeroelasticity research.

Marshall Space Flight Center (MSFC)

On 8 September 2010, 1,129 Marshall Space Flight Center team members and retirees marked MSFC's 50th anniversary in a striking manner outside Activities Building 4316, as photographed from an aerial boom crane. Hundreds more—along with federal, state, and local elected officials from Alabama; local civic leaders; and other special guests—joined in additional anniversary activities. MSFC had been dedicated exactly 50 years earlier, on 8 September 1960, in ceremonies led by President Dwight D. Eisenhower.



Stennis Space Center (SSC)

Stennis Launches 50th Anniversary Celebration with Legends Lectures Series

John C. Stennis Space Center launched a yearlong 50th anniversary celebration on 9 November 2010 with the first presentation in its Legends Lecture Series, in which former NASA leaders reflect on past work at the facility.

“There is no better way to celebrate 50 years of excellence at Stennis than to honor the leaders—the legends—who brought us to this point and to embrace

the lessons they provide,” Stennis Director Patrick Scheuermann said. “Stennis has established itself as the nation’s premier rocket engine test facility because of the commitment and dedication of these leaders and so many more. Even as we celebrate that history, we continue to build on our legacy, thanks to the commitment and dedication of countless others.”

Former leaders reflecting on the emergence of Stennis as a center of excellence during the first of several planned lecture series sessions included Jerry Hlass, former Stennis Space Center Director; George Hopson, former Space Shuttle Main Engine Project Manager; and J. R. Thompson, former NASA Deputy Administrator.



John C. Stennis Space Center Director Patrick Scheuermann (second from right) stands with Legends Lecture Series presenters (from left to right) George Hopson, Jerry Hlass, and J. R. Thompson. The three former leaders reflected on their experiences in the first of several planned lecture series sessions on 9 November 2010. The lecture series is part of the yearlong celebration of the 50th anniversary of Stennis.

NASA’s public announcement of Hancock County, Mississippi, as the site for a new rocket engine test facility came on 25 October 1961. Almost five decades later, three former NASA leaders returned to the facility to offer remembrances about their work. The leaders particularly focused on the transition of NASA from Apollo lunar missions to low-Earth orbit Space Shuttle missions during the 1970s.

Stennis Space Center played an integral role in each space program. The Mississippi facility tested all of the engines used on 11 piloted Apollo missions, including six missions that landed on the Moon. The facility then retooled to test all main engines used on more than 130 Space Shuttle missions to date.

The Space Shuttle Program is scheduled to end by the close of 2011, so Stennis now is in another transition period, preparing to test next-generation rocket engines that once more will carry humans beyond low-Earth orbit to deep space destinations, such as near-Earth asteroids, the Moon, or elsewhere. Work includes modifying two rocket engine test stands and building a new simulated high-altitude stand.

Even as those preparations continue, the Stennis community is reflecting on five decades of work that saw its facility emerge as the nation’s premier rocket engine test site. Fifty years ago, it was said that however America traveled to the Moon, it had to go through south Mississippi. Fifty years later, the same is being said once more—regardless of destination in space, the path leads through Stennis Space Center.

Hopson especially emphasized the importance of the Space Shuttle main engine testing conducted at Stennis. “We’ve flown some 400 successful engine flights and it’s because of the testing you do here,” he said. “I can’t tell you how much I respect you and what you do. If we didn’t have something like Stennis testing engines, I wouldn’t want to be manager of the engine project.”

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News from Headquarters and the Centers (continued)

Hlass and Thompson echoed the assessment. Thompson particularly cited the rigorous testing performed on the Space Shuttle main engine as key to its record of performance. “The engineering (of the engine) was superb, but I think the real heart of its success was the testing program,” he said. “You people played a tremendous role in the Space Shuttle main engine project, and I think you have a tremendous role to play today.”

Additional lecture series presentations will be held during the upcoming year, featuring various segments of the Stennis workforce, such as engineers and support personnel. Other activities commemorating the 50th anniversary year also are being planned.

Recent Publications

NASA Publications Reprinted by Dover Publications

Beyond the Atmosphere: Early Years of Space Science, by Homer E. Newell, Jr., with a new foreword by Paul Dickson (Dover Publications, October 2010). Ranging from the laboratory to the launching pad and from international conference halls to lunar wastelands, it chronicles technological advances; explores the relationship of space science to general science; and places the space program in a broader social, political, and economic context. The book was originally published as NASA SP-4211 in 1980.

Where No Man Has Gone Before: A History of NASA's Apollo Lunar Expeditions, by William David Compton with a new foreword by Paul Dickson (Dover Publications, December 2010). This official NASA history chronicles the behind-the-scenes conflicts and cooperation during the Apollo expeditions. It shows how the Agency's scientists, who were primarily interested in the Moon itself, worked out their differences with the engineers, who were charged with the astronauts' safe landing and return. The close collaboration between the scientists and engineers ensured the success of a program that remains a major achievement for both fields. The book was originally published as NASA SP-4214 in 1989.

The Partnership: A NASA History of the Apollo-Soyuz Test Project, by Edward Clinton Ezell and Linda Neuman Ezell with a new foreword by Paul Dickson (Dover Publications, January 2011). Told from the American perspective, this official history features interviews and firsthand observations about the first joint spaceflight during which the United States and Soviet Union met in orbit. The book was originally published as NASA SP-4209 in 1978.

New NASA Aeronautics Books

By Tony Springer

NASA's Contributions to Aeronautics, Volumes 1 and 2, edited by Richard P. Hallion. Since its creation, NASA has steadily advanced flight within the atmosphere, repeatedly influencing aviation's evolution by extending the rich legacy of its

predecessor, the National Advisory Committee for Aeronautics, or NACA. The first volume includes case studies and essays on NACA-NASA research for contributions such as high-speed wing design, the area rule, rotary-wing aerodynamics research, sonic boom mitigation, hypersonic design, computational fluid dynamics, electronic flight control, and environmentally friendly aircraft technology. The second volume includes wind shear and lightning research, flight operations, human factors, wind tunnels, composite structures, general aviation aircraft safety, supersonic cruise aircraft research, and atmospheric icing.

Available as an e-book online at <http://www.aeronautics.nasa.gov/ebooks/index.htm> and in hard copy from the NASA Headquarters Information Center or Amazon.com.

Commercially Published Works

Compiled by Chris Gamble

Multimedia

Pour l'amour du Ciel [For the Love of the Sky], by Maria Nicollier and Philippe Calame (CAB Productions, Label Image and Télévision Suisse Romande, 2006). Claude Nicollier reflects on his extraordinary life and career after more than two decades in the United States. About to return to the European Space Agency (ESA) in Germany, he must forgo his dream of flying in space and his American life and prepare for a more earthbound life in Europe. Characteristics: DVD Pal; Region 0; Languages: French, English, and German. Running time: 52 minutes. Extras: Nicollier's four Shuttle missions; Objective Mars; 6 Months in Space; ISS walk-through; Hubble clip. Extras running time: 90 minutes.

NASA Hubble High Resolution Image Archive Complete: 1990–2010, by Space Telescope Science Institute and Sky Image Lab; edited by James Turley (Sky Image Lab, November 2010). This collection includes over 2,500 images published between 1990 and 2010 by the Space Telescope Science Institute in the highest resolutions available. Images do not include the news release text. Most files in .tiff format. Includes a three-level clickable HTML index of thumbnails and full-size images. Supports all platform browsers: OSX, Windows, Unix. Archive is available in a three-disc DVD-ROM DL set or a 16-gigabyte Class 10 SDHC flash card.

Books

From Jars to the Stars: How Ball Came to Build a Comet-Hunting Machine, by Todd Neff (Earthview Media, November 2010). Ball Aerospace built NASA's Deep Impact comet spacecraft. The book relates the story of this company as well as the backgrounds, characters, and motivations of the men and women who created the spacecraft.

Sustaining the Global Positioning System, edited by Earl M. Peabody (Nova Science Publishers, Inc., March 2010). The Global Positioning System (GPS) not only provides positioning, navigation, and timing data to users worldwide, but it is also essential to U.S. national security and a key tool in an expanding array of public service and commercial applications at home and abroad. This book explores the challenges in sustaining and upgrading the system.

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Recent Publications (continued)

A History of Jet Propulsion, Including Rockets, by Raymond Friedman (Xlibris Corporation, April 2010). After World War II, dramatic advances in jet propulsion and long-range rockets were achieved, leading to supersonic flight, satellites, and flights above Earth's orbit. The technology behind these advances is described, along with short biographies of key pioneers.

Engineering the Space Age: A Rocket Scientist Remembers, by Robert V. Brulle (Books Express Publishing, May 2010). Robert Brulle found himself immersed in the Cold War race to the Moon, developing cutting-edge technology, instructing future astronauts in aerodynamics and orbital mechanics, perfecting high-performance fighter aircraft to meet the Soviet challenge, overseeing the procurement of new weapon systems, and exploring alternative energy sources. In this book, he shares his unique personal insights into the triumphs and tragedies of one of the most exciting eras in American history.

Crossing the Threshold: Advancing into Space to Benefit the Earth, by Paul O. Wieland (Threshold 2020 Press, June 2010). With a thoughtful program of space activities, the author argues that we can achieve a sustainable world with abundant energy and resources, a high standard of living, and unprecedented opportunity for all. This book shows a way to see space as integral to addressing societal issues.

The Wright Stuff: The Century of Effort Behind Your Ticket to Space, by Derek Webber (Collector's Guide Publishing, Inc., September 2010). The space tourism story, told through a well-selected collection of photographs, is of a succession of developments and risk-taking that goes back a century to the almost simultaneous start of both aviation and rocketry. The key people in this story are highlighted—and are given “The Wright Stuff” Awards—for their contributions.

Kennedy Space Center: Gateway to Space, by David West Reynolds (Firefly Books, September 2010). NASA's John F. Kennedy Space Center set the stage for the American adventure into space and went on to host a succession of rocket launches that have helped to form our understanding of the nature of the universe. This abundantly illustrated book is an insider's history of the heart of America's space program.

In Defense of Japan: From the Market to the Military in Space Policy, by Saadia Pekkanen and Paul Kallender-Umezuru (Stanford University Press, August 2010). *In Defense of Japan* provides the first complete, up-to-date, English-language account of the history, politics, and policy of Japan's strategic space development.

Skycrane: Igor Sikorsky's Last Vision, by John A. McKenna (American Institute of Aeronautics and Astronautics, August 2010). The Skycrane was the last creation of aircraft design pioneer Igor Sikorsky. John A. McKenna traces the development of this remarkable helicopter from original concept and early sketches to standout performer for the military and private industry.

Space: From Earth to the Edge of the Universe, by Carole Stott (DK Publishing, October 2010). *Space* takes us on an imaginary journey that starts on a launch pad,

goes toward the center of our solar system to see the inner planets and the Sun, and then flies outward past the outer planets and on to the fringes of the solar system.

Pluto: Sentinel of the Outer Solar System, by Barrie W. Jones (Cambridge University Press, October 2010). In this book, the author uses Pluto as a case study to discuss discovery in astronomy, how remote astronomical bodies are investigated, and the role of classification in science by discussing Pluto's recent classification as a dwarf planet.

The 50 Most Extreme Places in Our Solar System, by R. David Baker and James T. Ratcliff (Belknap Press of Harvard University Press, September 2010). This book moves our understanding of the extreme earthly phenomena (hurricanes, earthquakes, tsunamis, and volcanic eruptions) into extraterrestrial dimensions and gives us an awe-inspiring sense of what our solar system at its utmost can do.

Lunar Reconnaissance Orbiter Mission, edited by R. R. Vondrak, J. W. Keller, and C. T. Russell (Springer, September 2010). The book describes the the scientific objectives, the mission design, the flight system, and the instruments that carry out these investigations.

Go for Launch: An Illustrated History of Cape Canaveral, by Joel W. Powell and Art LeBrun (Collector's Guide Publishing, Inc., 2nd edition, September 2010). The book gives an exhaustive collection of detailed maps and aerial photographs revealing the famous launch complexes and basic infrastructure of Cape Canaveral. The daily activity of thousands of employees at the Cape is also provided in pictures providing an unprecedented behind-the-scenes look at America's rocket launches.

Atlas of the Galilean Satellites, by Paul Schenk (Cambridge University Press, September 2010). Featuring images taken from the recent Galileo mission, complete color global maps and high-resolution mosaics of Jupiter's four large moons—Io, Europa, Ganymede, and Callisto—are compiled for the first time in this atlas.

Saturn, by Alan Lawrie (Collector's Guide Publishing, Inc., 2nd edition, September 2010). Little has been written on the Saturn V rocket and next to nothing on the development, manufacturing, and testing of the rocket stages. In this book, for the first time ever, the detailed story of the history of each Saturn V stage is presented. The development of the F1 and J2 rocket engines is covered as well as details of all the major manufacturing and testing facilities.

Emergence of Pico- and Nanosatellites for Atmospheric Research and Technology Testing, by Purvesh Thakker and Wayne A. Shiroma (AIAA, Progress in Astronautics and Aeronautics Series, 234, September 2010). Miniaturized satellites are paving the way to a completely new era of faster and less expensive access to space by using smaller payloads. This book describes the current state of this exciting technology.

Talking About Life: Conversations on Astrobiology, edited by Chris Impey (Cambridge University Press, September 2010). This book explores current ideas

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Recent Publications (continued)

about the search for life in the universe. It contains candid interviews with dozens of astronomers, geologists, biologists, and writers about the origin and range of terrestrial life and likely sites for life beyond Earth.

Smithsonian National Air and Space Museum: An Autobiography, edited by Michael Neufeld and Alex M. Spencer (National Geographic, October 2010). Designed to convey the awe of a visitor first walking into the world's largest show-place of aviation history, this book headlines the incredible collections, both on view and behind the scenes, of the Smithsonian National Air and Space Museum.

Trailblazing Mars: NASA's Next Giant Leap, by Pat Duggins (University Press of Florida, September 2010). *Trailblazing Mars* offers an inside look at the current efforts required to travel to and from Mars. In this book, the author examines the extreme new challenges that will be faced by astronauts on the journey there and back.

Space Oddities: Women and Outer Space in Popular Film and Culture, 1960–2000, by Marie Lathers (Continuum, November 2010). This book examines the representation of women in outer space films from 1960 to 2000, with an emphasis on films in which women are either denied or given the role of astronaut.

The Race for Space—A Human Odyssey: Volume 1, Dawn of the Space Age (MP3 Editorial Ltd., October 2010). Subtitled “From the Wright Brothers to Sputnik 1, 1903–1930,” the book starts with rocket pioneers and visionaries and continues with Wernher von Braun and the V-2, the race to acquire German rocket know-how, and the first in space (Sputnik); it concludes with preparations for human flight.

The Race for Space—A Human Odyssey: Volume 2, First Into Space (MP3 Editorial Ltd., October 2010). Subtitled “Early Manned Missions, 1961–1963,” the book starts with rivals in space and then moves on to training for space, the first man into orbit, and the American response; it ends with the USSR's continuing pace in space.

The Race for Space—A Human Odyssey: Volume 3, Fly Me to the Moon (MP3 Editorial Ltd., October 2010). Subtitled “America's Project Apollo 1961–1965,” the book starts with the genesis of Apollo and continues with the Soviet response to Apollo, Project Gemini, and Apollo's taking shape. The book ends with unpiloted Gemini tests, Voskhod, and Alexei Leonov's first spacewalk.

Discovering the Oceans from Space: The Unique Applications of Satellite Oceanography, by Ian S. Robinson (Springer-Praxis, October 2010). The availability of satellite data has dramatically increased since the first ocean sensors were launched in 1978. Several satellites, ranging from TOPEX/Poseidon and Sea-viewing Wide Field-of-view Sensor (SeaWiFS) to new missions launched by ESA, NASA, and the National Space Development Agency (NASDA) since the new millennium, have provided almost comprehensive worldwide measurements of sea surface waves and wind, temperature, color, currents, and other ocean properties. The unique perspective provided by satellites has revealed previously undetected ocean phenomena, cast new light on old problems, and opened the way for new fields of oceanographic study.

Commercial Space Transportation, edited by Jocelyn S. Gunther (Nova Science Publishers, October 2010). This book focuses on recent trends in the commercial space launch industry, challenges that the FAA faces in overseeing the industry, and emerging issues that will affect the federal role.

NASA's Future and Its Pursuits, edited by Sophia C. Correno (Nova Science Publishers, July 2010). This book analyzes the issues of NASA's future pursuits and interactions with other federal agencies and the growing role of the space industry.

Foothold in the Heavens: The Seventies, by Ben Evans (Springer-Praxis, October 2010). This book, the second volume in the A History of Human Space Exploration series, focuses upon the 1970s, the decade in which humanity established a real, long-term foothold in the heavens with the construction and operation of the first space stations. This book covers each mission launched between April 1971 and April 1981.

Dream Walker: A Journey of Achievement and Inspiration, by Dr. Bernard A. Harris, Jr. (Greenleaf Book Group Press, October 2010). The book tells the compelling story of the first African American to walk in space, from his humble beginnings to his mission as a pioneering social reformer.

My Countdown, by Lena De Winne (Apogee Prime, October 2010). *My Countdown* captures the individual stories of crewmembers Roman Romanenko, Bob Thirsk, and Frank De Winne—all three members of ISS Expedition 20—and their spouses, Julia, Brenda, and Lena, as they prepare and embark on a unique spaceflight mission. It is resolutely biographical, offering a vivid recollection of events as they happened.

RocketScience: The Journal of the Detroit Rocket Society, Inc. 1947–1952, edited by Robert Godwin and Alfred Zaehring (Collector's Guide Publishing, Inc., October 2010). *The Journal of the Detroit Rocket Society* is an obscure rarity of rocket history and includes 552 photo facsimiles of every edition of the journal from 1947 to 1952. It features unique material by Krafft Ehrlicke, Hermann Oberth, Eugen Sänger, Heinz Koelle, and more.

The Power of Stars: How Celestial Observations Have Shaped Civilization, by Bryan E. Penprase (Springer, October 2010). This book explores the influence of the sky on both ancient and modern civilization by providing a clear overview of the many ways in which humans have used the stars as an ordering principle in their cultures and which still inspire us intellectually, emotionally, and spiritually.

Sizing Up the Universe: A New View of the Cosmos, by Richard J. Gott and Robert J. Vanderbei (National Geographic, November 2010). *Sizing Up the Universe* reveals an ingenious new way to envision the outsize proportions of space. Using scaled maps, object comparisons, and beautiful space photographs, it demonstrates the actual size of objects in the cosmos—from Buzz Aldrin's historic footprint to the visible universe and beyond.

Humans in Outer Space—Interdisciplinary Perspectives, edited by Jean-Claude Worms, Nina-Louisa Remuss, Kai-Uwe Schrogl, and Ulrike Landfester (Springer,

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Recent Publications (continued)

November 2010). Following the first volume titled *Humans in Outer Space—Interdisciplinary Odysseys*, this book investigates the human quest for odysseys beyond Earth's atmosphere and reflects on arising issues related to Europe's role among the states conducting human exploration.

Lakes on Mars, edited by Nathalie A. Cabrol and Edmond A. Grin (Elsevier Science, September 2010). On Earth, lakes provide favorable environments for the development of life and its preservation as fossils. Past and current missions have now demonstrated that water once flowed on the surface of Mars early in its history. Whether life existed on Mars is still unknown; upcoming missions may find critical evidence to address this question in ancient lakebeds as clues about Mars's climate evolution and its habitability potential are still preserved in their sedimentary record. *Lakes on Mars* is the first review on this subject.

Beyond the International Space Station: The Future of Human Spaceflight, edited by Michael J. Rycroft, Proceedings of an International Symposium, 4–7 June 2002, Strasbourg, France (Springer, November 2010). What will be the future directions of human spaceflight? That was the key question addressed at this symposium. Many ideas from the United States, Canada, Europe, Russia, and Japan were put forward on the “whys” and the “hows” of our future exploration of the final frontier and what is likely to be needed to make dreams come true.

Fifty Years of Flight Research: An Annotated Bibliography of Technical Publications of NASA Dryden Flight Research Center, 1946–1996, by David F. Fisher (Nimble Books, October 2010). Titles, authors, report numbers, and abstracts are given for more than 2,200 unclassified and unrestricted technical reports and papers published from September 1946 to December 1996 by NASA's Dryden Flight Research Center and its predecessor organizations.

Exploring the X-ray Universe, by Frederick D. Seward and Philip A. Charles (Cambridge University Press; 2nd edition, October 2010). Capturing the excitement and accomplishments of x-ray astronomy, this second edition now includes a broader range of astronomical phenomena and dramatic new results from the most powerful x-ray telescopes, with results from the most recent space-based instruments, including Röntgensatellit (ROSAT), BeppoSAX, the Advanced Satellite for Cosmology and Astrophysics (ASCA), Chandra, and X-ray Multi-Mirror (XMM).

Satellite Technology: Principles and Applications, by Anil K. Maini and Varsha Agrawal (Wiley; 2nd edition, October 2010). A comprehensive, single-source reference on satellite technology and its applications, this second edition of *Satellite Technology: Principles and Applications* includes the latest developments on the topic. Covering the features and facilities of satellites and satellite launch vehicles, with an emphasis on the fundamental principles and concepts, this book explains the past, present, and future satellite missions, as well as non-communication-related applications, from remote sensing and navigational uses to meteorological and military areas.

Higher and Faster: Memoir of a Pioneering Air Force Test Pilot, by Robert M. White and Jack L. Summers (McFarland & Company, Inc., October 2010). In 1961, pilot

Robert W. White flew a hypersonic rocket-powered airplane six times faster than the speed of sound and higher than 300,000 feet above Earth's surface. This is his story.

Surveyor: Lunar Exploration Program: The NASA Mission Reports, edited by Robert Godwin (Collector's Guide Publishing, Inc., October 2010). In order to safely land a man on the Moon, some fundamental questions needed to be answered. The Surveyor spacecraft, which landed on five sites and returned over 87,000 pictures from the lunar surface, met this requirement. This book contains previously unavailable documentation from this important program and is accompanied by a further 1,800 pages of material on the accompanying CD-ROM.

Operation of a Cryogenic Rocket Engine: An Outline with Down-to-Earth and Up-to-Space Remarks, by Wolfgang Kitsche (Springer, November 2010). This book presents the operational aspects of the rocket engine on a test facility.

Watching Earth from Space: How Surveillance Helps and Harms Us, by Pat Norris (Springer-Praxis, November 2010). This is the story of how our planet is being monitored by hundreds of spaceborne instruments for both military and peaceful reasons. It highlights the technical challenges of those instruments and describes the agencies that gather useful information from them. But such information can also lead to an erosion of personal privacy and freedom. This book looks at the possible conflict between public good and market forces, as well as the future development of new systems to deal with new needs.

Land Remote Sensing and Global Environmental Change: NASA's Earth Observing System and the Science of ASTER and MODIS, edited by Bhaskar Ramachandran, Christopher O. Justice, and Michael Abrams (Springer, October 2010). NASA's Earth Observing System's (EOS) primary goal is to study and understand all interacting components of Earth as a dynamic system. This book is an edited compendium that specifically focuses on the terrestrial components of change based on the scientific knowledge derived from data produced by two EOS instruments, the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) and the Moderate Resolution Imaging Spectroradiometer (MODIS), which are part of the Terra and Aqua satellite missions. The papers presented in this volume demonstrate the value of EOS for studying Earth's surface.

Soviet and Russian Ekranoplans, by Yefim Gordon and Sergey Komissarov (Midland Publishing, April 2010). This book offers a type-by-type description of the ekranoplans (large vehicles hybridizing a ship and an airplane) developed in the Soviet Union and Russia over the past 50 years. Special emphasis is put on the Rostislav Alekseyev-led design bureau that produced the KM-1 "Caspian Sea Monster," Orlyonok, and Loon, which remain unsurpassed in size and payload.

National Regulation of Space Activities, edited by Ram S. Jakhu (Springer, December 2010). This book addresses all aspects of national space laws and regulations governing the conduct of space activities in 15 spacefaring nations. This book explores the policies and rationales underlying the law, constitutional basis for the adoption of national space laws, and some facts about national space activities in the respective countries; it also discusses the relevant principles and

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Recent Publications (continued)

rules of international space law in order to bring to light the international context of the national laws described.

Future of U.S. Human Spaceflight: Background and Issues, edited by Derek A. Warren and Bridget D. Conway (Nova Science Publishers, Inc., September 2010). This book explores the nation's important decisions on the future of human spaceflight through public documents, which have been located, gathered, combined, reformatted, and enhanced with a subject index.

The Politics of Space: A Survey, by Eligar Sadeh (Routledge, December 2010). The development and exploration of space are scientific and engineering pursuits. However, politics determine which space programs and projects are pursued and establish cost, performance, and schedule parameters for these ends. This book provides an overview of the politics of space with regard to national space efforts, as well as national and international organizations.

Edwards Air Force Base (Images of Aviation), by Ted Huetter and Christian Gelzer (Arcadia Publishing, December 2010). Edwards Air Force Base is a strategic flight-test, research, and development center for the U.S. Air Force, NASA, and civilian contractors. Speed and altitude records were commonplace at Edwards during the 1950s. Suborbital spaceflights began there in the 1960s. In the 1970s it was the primary testing site for the Space Shuttle Program. Dramatic aerospace research continues today at Edwards, America's proving ground for the future of high-technology aviation.

Online Resources

Other Sites of Interest

The Society for the History in the Federal Government (SHFG) announces a redesigned Web site with more news and features on the federal history community including federal history work articles, recent publications, conferences/events listings, the *Federalist* newsletter, *Federal History* journal, and more. SHFG features the work of federal history offices and discussion of the issues they face.
<http://www.shfg.org>

Other Aerospace History News

National Air and Space Museum (NASM)

Compiled by Michael Neufeld

On 19 November 2010, NASM officially opened the completed *Barron Hilton Pioneers of Flight* gallery, which was curated by members of the Aeronautics

and Space History Divisions, notably Dorothy Cochrane, Jeremy Kinney, Michael Neufeld, Cathleen Lewis, and Von Hardesty. This exhibit features a completely new display focused on aircraft that have mostly been around since 1976, such as the Fokker T-2 (the first nonstop, coast-to-coast flight in the U.S.), the Douglas World Cruiser *Chicago* (one of the first two around-the-world aircraft), Amelia Earhart's Lockheed Vega (first transatlantic flight piloted by a woman), and Charles Lindbergh's Lockheed Sirius *Tinqmissartog* (pioneering transatlantic and transpacific flights). Also included in the exhibit are an entirely revamped Black Wings display and a new section on rocketry in the 1920s and 1930s, which is the theme of the gallery. That section includes a Soviet model of a Konstantin Tsiolkovsky rocket proposal, Robert Goddard's Hoopskirt rocket of 1928, and the American Rocket Society's Test Stand No. 2 of 1938–41.

Roger D. Launius (Space History Division), James Rodger Fleming (Colby College, former NASM Lindbergh Chair), and David H. DeVorkin (Space History), have edited *Globalizing Polar Science: Reconsidering the International Polar and Geophysical Years* (Palgrave Studies in the History of Science and Technology, New York: Palgrave Macmillan, November 2010). This publication brings together 19 historical essays on various aspects of the International Polar Years and the International Geophysical Year drawn from a conference held at the Smithsonian Institution in 2007.

Von Hardesty (Aeronautics Division) is working on a major revision of *Red Phoenix: The Rise of Soviet Air Power, 1941–45* (1982, 1990). This major project has been completed in collaboration with Ilya Grinberg. The book will be published by the University Press of Kansas in its military history series. Hardesty has also been invited by the Miller Center of Public Affairs, University of Virginia, to help plan and to contribute a paper for a scholarly symposium titled "The Evolution of Presidential Travel: How Improved Mobility Impacts the Role and Image of the President." At NASM, Hardesty is serving as the curator for the new Smithsonian Institution Traveling Exhibition Service (SITES) traveling exhibit on Black Wings. It is tentatively scheduled for late 2011. Finally, Hardesty has been asked to serve as a consultant and writer for a new history of Hawaiian Airlines, which dates back to 1929.

Space History staff and volunteers have published several articles in *Quest, The History of Spaceflight Quarterly*: James David, "What Should Corona Photograph and How Often?" in vol. 17, no. 3 (2010): 42–52; Paul E. Ceruzzi, "Deep Space Navigation: the Apollo VIII Mission," vol. 17, no. 4 (2010): 8–18; and Edgar Durbin, "Saturn I Guidance and Control Systems," vol. 17, no. 4 (2010): 19–31.

USC and Huntington Library Create Aerospace History Project

Southern California, as we know it, would not exist without aerospace. For much of the 20th century, aerospace became the primary economic driver of Southern

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USC and Huntington Library Create Aerospace History Project (continued)

California's growth, transforming it from Sunbelt orange groves to a high-technology metropolis.

Despite its importance to American history and the history of science and technology, the aerospace industry in Southern California has attracted surprisingly little scholarly attention. One primary reason for such neglect is a lack of organized and accessible sources. Archival material remains scattered among individuals and institutions, if it has survived at all. And with each passing year, more of this history is lost forever.

The Huntington Library and the University of Southern California (USC) have created a project to document the history of Southern California aerospace through archival collections and oral history. Initial archival acquisitions include the papers of Ben Rich, the longtime head of Lockheed's Skunk Works; Willis Hawkins, a Lockheed designer for 50 years and the first president of Lockheed Missiles and Space; Harvey Christen, Lockheed's first employee; Albert Hibbs, an architect of the early space program at the Jet Propulsion Laboratory and a polymathic science popularizer; and Jack Real, a longtime Lockheed designer and close confidant of Howard Hughes. The papers of Tex Thornton, founder of Litton Industries, are also committed to the archive.

The Hawkins and Christen collections include several thousand unpublished photos spanning six decades of American aviation. Project historians, to date, have also completed 40 oral-history interviews of aerospace corporate leaders, design engineers, and manufacturing engineers. These interviews provide a window on the industry from corporate boardrooms to engineering bullpens and the shop floor, as well as from old-school aerospace firms to alt.space startups.

The Aerospace History Project is a major initiative of the Huntington-USC Institute on California and the West (ICW), a collaborative research and teaching enterprise devoted to scholarly investigation of the history and culture of the American West. The project combines the curatorial resources of the Huntington Library with the research and teaching capabilities of USC; it capitalizes on Huntington's strengths in California and the West, history of science and technology, and business history. The project is supported by the National Science Foundation and the Northrop Grumman Foundation.

The aerospace project is led by Peter Westwick, a Huntington Fellow; William Deverell, ICW director and professor of history at USC; and Dan Lewis, Dibner Senior Curator of the History of Science and Technology at the Huntington Library. Project staff include two processing archivists at Huntington and Matthew Hersch, an aerospace postdoctoral Fellow at USC. An anthology of essays on Southern California aerospace, edited by Deverell and Westwick, is forthcoming from University of California Press.

Please see the ICW Web site (<http://www.usc.edu/icw>) for future announcements of new acquisitions, or contact Peter Westwick (westwick@usc.edu) for more information. The project welcomes suggestions of potential collections or oral histories.

Call for Papers

Palgrave Studies in the History of Science and Technology

Series editors James Fleming (*jflaming@colby.edu*) and Roger Launius (*launiusr@si.edu*) invite proposals for a new series in the history of science and technology published by Palgrave Macmillan in New York. Designed to bridge the gap between traditionally divergent fields, Palgrave Studies in the History of Science and Technology aims to publish the best new work by scholars. The series accommodates a wide variety of titles, including but not limited to research monographs, synthetic studies, biographies, conference volumes, and single-authored works featuring ethical and public policy debates and issues in cultural context. Their dominant disciplinary approach is historical, but they may also incorporate economic, social, cultural, anthropological, and political perspectives.

International Journal of Project Management

For a special issue on project history, guest editors Jonas Söderlund and Sylvain Lenfle invite proposals that address the lack of historical understanding of the emergence of project management and the importance of landmark projects. In seeking to integrate historical research with project management research, the editors hope to

- illustrate and analyze the role of projects and project management for industrial and societal development;
- establish a more complete understanding of project management that is different from the conventional “tools and technique” tradition;
- identify and discuss a number of generic problems in the practice of project management;
- create a better empirical common ground among scholars within the domain of project management—for instance, through common examples and common problems;
- give a broader picture of project and project management history, complementing the dominant view that project management is a managerial innovation stemming from the defense industry, particularly in the United States;
- identify practices that seem to be critical for the success of projects and that are grounded on a contextual understanding of the particular project at hand; and
- document the emergence of certain practices of key concern within project management, such as planning techniques, coordination mechanisms, team structures, and visualization tools.

continued on next page

Call for Papers (continued)

In this perspective, this special issue seeks to gather interesting work on management and business history that specifically addresses the individual project (or a series of projects/programs). The prime focus is on what might be referred to as industrial projects of various sorts—the early influential infrastructure projects (canal projects, railway projects), the large-scale development projects from the 1940s to the 1960s, or a more contemporary project that exemplifies innovative practices. The editors also want to invite studies of special kinds of influential construction projects that not only created objects of significance, but also created them in a novel way, which later on influenced subsequent project management practice. In addition, the editors invite contributions that position and present the studied project in its historical and institutional surroundings.

For more information or to e-mail an abstract, please contact the special issue editors:

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 Ecole Polytechnique
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Upcoming Meetings

The 27th National Space Symposium will be held **11–14 April 2011** in Colorado Springs, Colorado. Please see <http://www.nationalspacesymposium.org/> for more details.

The International Academy of Astronautics will host the 18th Humans in Space Symposium on **11–15 April 2011** in Houston, Texas. Please see <http://www.dsls.usra.edu/meetings/IAA/> for more details.

The NASA History Program Office and the National Air and Space Museum's Division of Space History will hold a joint symposium, "1961/1981: Key Moments in Human Spaceflight," from **26 to 27 April 2011** at NASA Headquarters in Washington, DC. Please see <http://history.nasa.gov/1961-1981conf/index.html> for more details.

The 30th Annual International Space Development Conference (ISDC) will be held **18–22 May 2011** in Huntsville, Alabama. Please see <http://isdc.nss.org/2011> for more details.

The 218th meeting for the American Astronomical Society will be held **22–26 May 2011** in Boston, Massachusetts. Please see http://www.aas.org/meetings/meeting_dates.html for more details.

The NASA History Program Office will hold the History Program Review from **7 to 9 June 2011** at Glenn Research Center in Cleveland, Ohio. For more information, please contact Nadine Andreassen at nadine.j.andreassen@nasa.gov.

The annual conference for the Special Libraries Association will be held **12–15 June 2011** in Philadelphia, Pennsylvania. Please see <http://www.sla.org/content/events/index.cfm> for more details.

The annual conference for the American Library Association will be held **23–29 June 2011** in New Orleans, Louisiana. Please see <http://www.alaannual.org/> for more details.

The 75th annual meeting for the Society of American Archivists will be held **22–27 August 2011** in Chicago, Illinois. Please see <http://www2.archivists.org/conference/2011/chicago> for more details.

The 62nd International Astronautical Congress will be held **3–7 October 2011** in Cape Town, South Africa. Please see <http://www.iac2011.com> for more details.

The annual meetings for the Society for the History of Technology, the History of Science Society, and the Society for the Social Studies of Science will be held **3–6 November 2011** in Cleveland, Ohio. Please see http://www.historyoftechnology.org/annual_meeting.html, <http://www.hssonline.org/Meeting/>, and <http://www.4sonline.org/meeting> for more details.

Obituaries

Nathaniel B. Cohen

Nathaniel B. Cohen passed away on 17 December 2010. He first joined the National Advisory Committee for Aeronautics as an aerospace engineer for Langley Aeronautical Laboratory in December 1952, which became Langley Research Center after 1958. During his long career, Cohen served as the Director for the Office of Policy Analysis in 1971 and Director for the Management Support Division in 1977 at NASA Headquarters. He received his Bachelor of Aeronautical Engineering degree from the Polytechnic Institute of Brooklyn in 1950 and a Master of Aeronautical Engineering from the University of Virginia in 1956. Cohen also served in the U.S. Army from 1950 to 1952.



Nathaniel B. Cohen.

Images in Aerospace History

Every 29 January, NASA participates in a Day of Remembrance to commemorate the men and women lost in the quest for space exploration.



The Apollo 11 prime crew for the first piloted Apollo spaceflight. From left to right: Edward H. White II, Virgil I. "Gus" Grissom, and Roger B. Chaffee.



The STS-51L Space Shuttle *Challenger* crewmembers. Back row, left to right: Mission Specialist Ellison S. Onizuka, Teacher in Space Participant Sharon Christa McAuliffe, Payload Specialist Greg Jarvis, and Mission Specialist Judy Resnik. Front row, left to right: Pilot Mike Smith, Commander Dick Scobee, and Mission Specialist Ron McNair.



The official crew photo for STS-107 on the Space Shuttle *Columbia*. From left to right: Mission Specialist David Brown, Commander Rick Husband, Mission Specialist Laurel Clark, Mission Specialist Kalpana Chawla, Mission Specialist Michael Anderson, Pilot William McCool, and Israeli Payload Specialist Ilan Ramon.

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Do you have more questions about NASA history in general? Please check out our NASA History Program Office Home Page at <http://history.nasa.gov> on the Web. For information about doing research in the NASA History Program Office, please e-mail us at 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 Giny Cheong, newsletter editor, at giny.cheong@nasa.gov.

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