News & Notes

National Aeronautics and Space Administration

NASA HISTORY PROGRAM OFFICE
Office of Communications

Volume 31, Number 3

Third Quarter 2014

From the Chief Historian

This summer has proven a constant reminder of the inevitability and speed of the march of time. It hasn't been simply the flitting away of those lazy days of summer vacation, the passing of yet another birthday, or the demolition of another historic wind tunnel complex at Langley, but a combination of events that has made me increasingly mindful of the need to cherish what we have.

Particularly striking this summer has been the news of the loss of two great friends of NASA history. Elsewhere in this issue, you will see a short appreciation of Fred Ordway. Fred passed away at his home in Huntsville, Alabama, on 1 July. Having pored through his books as a boy, I had the great pleasure of getting to know Fred personally over the last couple of years—and it was really quite a pleasure. He was a gentleman of the old school and someone who had never lost his boyish enthusiasm about space exploration.

You will also find, elsewhere in this issue, a message from Rio Phair—the sister of Curtis Peebles. Enthusiastic and energetic, Curtis worked for many years on aerospace history at Dryden (now Armstrong) Flight Research Center and was the author (or coauthor) of three NASA history publications. He dropped out of sight about a year ago, and many of you may have heard rumors about what happened. Rio contacted us early in the summer and confirmed that Curtis is now in care and suffering from irreversible memory loss. For anyone who has suffered with an aging

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Call for Papers

The NACA Centenary: A Symposium on 100 Years of Aerospace Research and Development

The Smithsonian Institution's National Air and Space Museum (NASM) and NASA's History Program Office invite proposals for papers to a special symposium commemorating a century of aerospace research and development. On 3 March 1915, the United States Congress established the National Advisory Committee for Aeronautics (NACA) "to separate the real from the imagined and make known the overlooked and unexpected" in the quest for flight. In honor of that centennial, NASA and NASM will team to present a symposium on the history of the NACA. This historical symposium will be held in Washington, DC, on 3–4 March 2015.

All are invited to submit proposals. Major themes to be addressed in the symposium include the following:

- The NACA organizational and institutional structure and evolution
- The NACA model of public-private partnerships in aerospace research

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In This Issue:

From the Chief Historian (continued)

parent or other relative with memory loss, you know how painful this can be on family and friends. To encounter this in someone who should still be in the prime of his intellectual life is heartbreaking. I salute Rio for her bravery in facing this situation and wish her, and Curtis, strength and courage for the days ahead.

On a more upbeat note, after nearly a year, the NASA Historical Reference Collection opened in its newly renovated space on the Concourse level of the Headquarters building. We are in room CP72, to be exact. The facility enjoys new compact shelving, new lighting and furnishings, and much-improved workspace for staff and researchers. The doors officially opened to visitors on Tuesday, 9 September. Please call 358-0384 or e-mail *histinfo@nasa.gov* to schedule an appointment at least a day in advance of your visit. While we would love to have you all visit us that first week, please keep in mind that our space for researchers is still limited. We look forward to seeing you soon!

The rush of time is also bringing us quickly to 3 March 2015—the centennial of the creation of the National Advisory Committee for Aeronautics (NACA). We've spent a lot of time here within Headquarters, and with many partners, planning events and focusing our messages about the legacy of the NACA. In the process, I've had to indulge in some reading about our institutional predecessors. It has been a surprising and delightful education, and one that has left me wondering why there has been so little historical study of the NACA. We hope to rectify that shortcoming, at least a bit, with a historical symposium next 3–4 March, in conjunction with our friends at the National Air and Space Museum. Through the symposium and the book that we expect to come from it, we hope to increase public understanding of the importance of the NACA to the worldwide development of aeronautics, how the NACA's post–World War II research laid the basis for the Space Age, and how the legacy of the NACA lives on at NASA. As we close in on the anniversary, I'm tempted to worry about the work yet to be done and the rush of time—but I'm also working to remember to cherish today. I hope you do too.

Godspeed,

William P. Barry
Chief Historian

Call for Papers (continued)

- The NACA's contributions to aerospace theory, ground research, and flight operations
  - Individual projects
  - Broad themes in the history of the agency
  - Research projects versus other structural attributes
- The social, economic, and/or political history of the NACA
- The NACA culture and its evolution
- The relationship of the NACA to other entities, both private and public
- Innovation in aerospace research
- Models of partnership

Possible topics are not restricted to these major themes. All papers are envisioned as scholarly contributions exploring broad thematic issues and questions.

Contributions from international scholars and graduate students with an interest in this history are welcome.

Some travel support scholarships may be available for international scholars and graduate students. Please indicate your interest in a need statement included with your paper proposal.

We intend that a subset of the papers will merit publication.

Proposals for papers should include a title and abstract, as well as the author's curriculum vitae (CV) and travel support need statement (as appropriate). Please send all proposals, in the form of a 300-word abstract and a brief CV, electronically to Dr. William P. Barry, NASA Chief Historian, at *bill.barry@nasa.gov* and to Dr. Roger D. Launius, Associate Director for Collections and Curatorial Affairs at the National Air and Space Museum, at *launiusr@si.edu*. **The deadline for abstract submissions is 15 September 2014**.

Decisions about acceptance and support will be made by 1 November 2014.

Reflections on Interning with NASA's History Program Office

By Mary Catherine Bitter

Prior to beginning my internship with the NASA History Program Office, I expected that the position would exercise my ability to research topics and write pieces about them. My expectations were certainly met, to say the least. Over the past three months, I've written biographical articles, photo captions, Facebook posts, and, of course, hundreds of tweets. The main thing that I gained from my

internship, however, was something that I did *not* expect, something completely unrelated to the writing process: a crash course in, and appreciation for, the history of spaceflight.

Beginning my internship in mid-May and learning the ropes alongside my fellow summer intern, Will Thompson, I found myself surrounded by space history enthusiasts—and not only my coworkers. Each day, after creating social media posts based on historical anniversaries, I would scroll through and read the responses from NASA History's followers. Plenty of people seemed more knowledgeable than me, and some even added their own tidbits of history to the story. It was common to get comments from those who remembered historic events, such as the launch of Gus Grissom's Liberty Bell 7 mission or the Apollo 11 Moon landing. I think that I best connected with the space history community when I attended the National Air and Space Museum's 11th Annual John H. Glenn Lecture in Space History, entitled "From Air and Space to the Railroad and Beyond: An Evening with Brig. Gen. James A. McDivitt." For an hour and a half, the audience laughed along with and learned from General McDivitt, myself among them.

Additionally, interning at NASA History means becoming immersed in the celebration and remembrance of historical events that have helped NASA become what it is today. Over the course of the summer, there were a few historical anniversaries that stood out above the rest. In June, NASA celebrated the 50th anniversary of the Civil Rights Act of 1964, which was signed into law on 2 July 1964, with distinguished panelists discussing the significance of the act across the nation, as well as how it impacted the Agency. In July, the Agency celebrated the 45th anniversary of Apollo 11, the mission that first landed humans on the Moon. I had the opportunity to meet Apollo 11 astronauts Buzz Aldrin and Michael Collins, who visited NASA Headquarters after making a stop by the White House to speak with President Obama. More recently was one of my personal favorites, and also one that I was around for—6 August marked the day that the Curiosity rover successfully landed on Mars two years ago.

Overall, it might be easy to tell that my internship with NASA History was a great experience (and I'm not just talking about the kind on a résumé!). I met numerous astronauts, learned about future NASA missions (hello, Mars!), and learned in a way that no classroom could ever replicate. If anyone reading this knows of someone who might be interested in taking on this internship, please encourage him or her to apply—it makes for an unforgettable time!

News from Headquarters and the Centers

NASA Headquarters

History Program Office

By Bill Barry

It has been a very busy summer for the History Program. With the reconstitution of the Historical Reference Collection (more on that from Jane below), travel, interns going and coming, and a bit of vacation time, it seems like the time has flown by.

As usual with "round number" anniversaries, we saw a huge spike in activity with the Apollo 11 45th anniversary this summer. The NASA emphasis was on the "next giant leap," but we still had plenty of opportunity to promote history. I spent a couple of days in mid-July at the Intrepid Space and Science Festival in New York City, staffing the historical displays and giving a few talks on historical subjects. Interestingly, one of the best-attended talks was an Apollo 11 "mission status briefing," during which we took a little time-machine trip back to 1969 to see what was happening that day (18 July) on Earth and with the crew of Apollo 11 on the way to the Moon. While that talk was fun, it wasn't nearly as popular as the touchable Moon rock—which kids of all ages found irresistible. I also had a chance to give a talk at the Experimental Aircraft Association's AirVenture in Oshkosh, Wisconsin, this summer. This time, though, the emphasis was not on the Apollo anniversary, but on the centennial of the NACA. It was a great opportunity to try out a centennial presentation on an appreciative and friendly audience.

Next spring's anniversary of the creation of the NACA has become a growing focus of activities here. We've got three publications in the pipeline related to the event: an annotated bibliography on the NACA, a centennial history of the NACA/NASA (on the model of "Orders of Magnitude"), and a work on NACA/NASA logos and insignia. We are also working closely with our colleagues in the Aeronautics Research Mission Directorate at Headquarters to make sure that the centennial themes are worked into NASA communications over the coming months. In addition, there are a number of events in development to mark the anniversary. These include a panel at the American Institute of Aeronautics and Astronautics (AIAA) SciTech 2015 conference in January 2015 and a historical symposium at the National Air and Space Museum on the anniversary itself. You'll find the latest on these and other events on our Web site and social media accounts.

Summer interns Will Thompson and Mary Catherine Bitter did a stupendous job for us. They are both back at school now—Will at Virginia Commonwealth University and Mary Catherine at George Washington University. But while they were here,

they did a phenomenal job with our social media accounts (pushing the view numbers on our new Flickr-based Great Images in NASA [GRIN] to incredible heights) and did a series of Web stories about the NACA namesakes for various NASA Centers. Fall will, of course, bring new interns. This fall, we have Amy Wallace, a senior history major at the University of Mary Washington. She'll be interning on Mondays, Wednesdays, and Fridays. Nolan Lott, a junior at Nebraska Wesleyan University, will be in Washington on a semester-in-DC program, so we'll see him interning with us Monday through Thursday each week.

Historical Reference Collection

By Jane H. Odom

The Headquarters History Office renovation is complete. The office is sparkling new with modern lighting, furnishings, and mobile shelving to increase our storage capacity. By the time you read this, the archive restoration project will be complete. Nearly 2,000 cubic feet of archive materials and books were returned from the warehouse and the interior decorating completed. Archival reference services were greatly impacted between November 2013 and July 2014, during which time the staff had to rely on digitized collections and published sources to provide answers to customers with historical inquiries. Additionally, we had to refer researchers to Center history offices, the National Archives and Records Administration (NARA), the Presidential Libraries, and other repositories while our collection was closed.

Archival processing and digitization projects proceeded apace while the archivists were in temporary quarters during the renovation. One collection of note that was processed and will be made available as soon as the reference collection reopens is the Paul Lowman collection. He was commonly referred to as NASA's first geologist, having worked at the Agency for over 50 years. In his collection are biographical materials; articles he authored, as well as the source materials he used; news clippings; photos; lunar vehicle proposals; and field trip memo books, correspondence, and photos. Also in the collection is a draft manuscript entitled "Fifty Years in Space Research: A Scientific Autobiography."

Check our Web site at *http://history.nasa.gov* for periodic updates on the archives restoration and the grand reopening. We look forward to seeing you soon!

Ames Research Center (ARC)

By Glenn Bugos

The 75th anniversary edition of *Atmosphere of Freedom* (NASA SP-2014-4314) has just been released. With a foreword by Pete Worden and Jack Boyd, an introduction by Lew Braxton, and a preamble by Harry McDonald, it is an overview history of the Center during its years with NASA, updated with the most significant

changes over the past five years. It is lavishly illustrated with the best photographs from the Ames archives. Plans are for limited distribution among Center staff; it is available at our Web site as a PDF, and the NASA history community can request a printed copy by contacting our office directly.

Astronomers Ed Erickson and Allan Meyer authored a history of the Kuiper Airborne Observatory (KAO) titled *NASA's Kuiper Airborne Observatory: An Operations Perspective with a View to SOFIA* (NASA SP-2013-216025). It is a wonderful history of research at NASA Ames on airborne infrared astronomy, focusing on the evolution of the KAO from 1972 to 1995, as the scientists using it learned how to improve its performance and operational efficiency. It also serves as a photo album of the many scientists from diverse universities and nations who flew their instruments aboard the KAO. As the Stratospheric Observatory for Infrared Astronomy (SOFIA) is increasing its science flights, Erickson and Meyer's monograph will serve as a useful guide on this pioneering era in airborne infrared astronomy.

Yvonne Clearwater and Lois Rosson produced a superb *NASA Ames Technology Transfer Historical Image Gallery, 1976 to 2012*. For 50 notable technology-transfer examples, they compiled photographs and supplemented them with detailed captions available online at *http://www.nasa.gov/content/nasa-ames-tech-transfer-gallery*.

NASA Ames staff has begun celebrating the 75th anniversary of the Center's groundbreaking on 20 December 1939. An open house is scheduled for 18 October, and the public is invited to take a walking tour around the Ames campus. Sheila Johnson organized a living museum, with NASA Ames displays in downtown storefronts and public buildings in neighboring Mountain View and Sunnyvale. April Gage refreshed the History Office Web site in anticipation of new anniversary content, including information on Ames award winners as well as our newest history publications.

April also processed the papers of Roger D. Arno, a spacecraft engineer who worked at NASA Ames from 1966 until his retirement in 2000. This collection focuses on Arno's artwork, primarily computer designs of mission concepts and hardware. It also includes editorial cartoons, with amusing depictions of the culture and work at NASA and Ames.

Armstrong Flight Research Center (AFRC)

By Christian Gelzer

Our Center, now Armstrong Flight Research Center, went through its official renaming ceremony on 13 May. Attending the event were members of both the Dryden and the Armstrong families; NASA Administrator Charlie Bolden and Majority Leader–elect Kevin MacCarthy also attended. This marks the 10th time the Center, or facility as it was between 1946 and 1959, has undergone a name

change—possibly a record for NASA Centers. The Western Aeronautical Test Range was renamed and is now the Dryden Aeronautical Test Range.

Christian Gelzer is completing his monograph about the Center's Flight Loads Laboratory, which was established in 1964 to support the X-15 program and to solve problems with the first piloted hypersonic aircraft. He's been interviewing current and retired employees as part of the project, and the manuscript will be in peer review by the time you read this. It is due for publication in time for the Lab's 50th anniversary in October. His monograph, *The Spoken Word: Recollections of Dryden History; the Shuttle Years*, recently received an Award for Publication Excellence (APEX) award.

Glenn Research Center (GRC)

By Anne Mills

Glenn Research Center was pleased to host historians Sandra Johnson and Rebecca Wright from Johnson Space Center as part of the NACA Centennial Oral History Project. Ten NACA retirees were interviewed. Among those interviewed were Robert Hendricks, Irv Zaretsky, and Len Tower, who continue to serve the Center as Distinguished Research Associates. Other participants included photographer Bill Wynne and Irene Geye, former secretary to first Center Director Ed Sharp. Transcripts should be available online soon through the NASA Oral History program.

The next book in GRC's history series is one step closer to publication. The manuscript for the history of the Plum Brook Small Hydrogen Sites has been submitted for peer review. These facilities are notable for their testing of liquid hydrogen, oxidizers such as chlorine and fluorine, and turbopump components critical to the success of the early space program.

Jet Propulsion Laboratory (JPL)

By Erik Conway

JPL and the Exploration of Mars is finally in production at Johns Hopkins University Press. Erik Conway has received and reviewed the copyedited manuscript and expects a spring 2015 publication date.

In May, Erik finished editing and revising Craig Waff's history of the Deep Space Network and sent it to the NASA History Program Office. He mainly left the mostly clean text alone; revision consisted largely of filling in some missing facts, correcting grammar, bringing the notes into alignment with his papers' new location at JPL, and selecting new images. The history will be a welcome complement to Douglas Mudgway's more technically oriented histories of the organization.

The Center also started production on the next in the series of JPL history documentaries. This one covers, roughly, the 1980s, and its theme will be the Space Shuttle. Erik has largely finished interviewing people for the show. Production is otherwise going slowly, in part because the office has switched to a new digital video archive system ("CatDV") that the editors are still learning.

Erik has also conducted a small cluster of audio-only interviews around the design of the Galileo spacecraft, in particular dealing with the engineering challenges imposed by the dual-spin design and the propulsion system provided by Germany.

Two celebrations were held during July at JPL. One of the two Ranger project managers, Bud Schurmeier, passed away late last year, and the Center celebrated his life on 8 July. The 50th anniversary of JPL's first successful Moon mission, Ranger 7, was 31 July, and JPL celebrated it with a short event aimed primarily at summer interns, who number over 600 this year.

Intern Kate McManus was with the JPL Archives for about 9 weeks. Kate has a bachelor's degree in history and is working on a master's in library science (with a focus on archives) at St. Catherine University in St. Paul, Minnesota. As she worked on an inventory of JPL photo collections, she searched more than six different photo resources to find out which images are in digital format and which ones exist only in hard copy (prints or negatives). She also scanned a sample collection of photos and processed a small collection of archival records. Her final report will help the archives plan, prioritize, and budget for future scanning projects and also make the photo collections more accessible to researchers.

Johnson Space Center (JSC)

By Rebecca Wright

At the request of the JSC Historic Preservation Officer, the Johnson Space Center History team joined the effort to preserve the history of the Arc Jet Facility. Earlier this year, the Center began the final phases of closing out Building 222, home of the Atmospheric Re-entry Materials and Structures Evaluation Facility (ARMSEF). The building, slated for demolition, is eligible for listing on the National Register of Historic Places under the Space Shuttle Program. Although there was a very short timeframe available, the JSC History team worked with a producer and videographer from the Information Technology and Multimedia Services (ITAMS) Communication Services group to ensure that information was captured about this unique facility and from some of the employees who had worked there. Additional oral histories were conducted by the JSC Historian to provide a more complete accounting of the activities and events that were conducted during the long history of the Arc Jet. Transcripts from the oral history sessions will be posted on the JSC History Portal (*http://www.jsc.nasa.gov/history*). The ITAMS Communications Services team will be providing a brief video explaining the

history of JSC's Arc Jet, and it will be posted online next year by the Historic Preservation Officer and the JSC History Portal.

Simon & Schuster has released *Sally Ride: America's First Woman in Space*, written by Lynn Sherr, award-winning broadcaster and writer. The author, who reported on the Space Shuttle Program from its first flight in 1981 through the Challenger mishap in 1986, listed the extensive sources she used, including numerous interviews from the JSC Oral History Project. Sherr also had a number of conversations with the JSC Historian, Dr. Jennifer Ross-Nazzal, who provided additional insight and guidance with NASA oral history interviews and potential sources.

Kennedy Space Center (KSC)

By Tim Davis, Historic Preservation Officer at White Sands Test Facility

Kennedy Space Center recently signed a 20-year lease with SpaceX for the use of historic Launch Pad 39A. This process is an excellent example of beneficial reuse of a historic property that supported both the Apollo and Space Shuttle programs. This lease agreement keeps the historic launch pad active and ensures that maintenance requirements are continued, which saves NASA more than $1 million annually. A recent *Florida Today* story that further describes this is available online at *http://www.floridatoday.com/story/tech/science/space/2014/04/14/spacex-takes-over-ksc-pad-39a/7711859/*.

KSC received the American Cultural Resources Association (ACRA) Industry Public Sector Award after being nominated by New South Associates, Inc., and Archaeological Consultants, Inc. The ACRA awards for 2013 recognized both public- and private-sector organizations for cultural resource management commitments that routinely exceed those required by federal and state laws and regulations. The following narrative that describes the KSC activities resulting in the award was printed in the fall 2013 ACRA newsletter (volume 19-4):

> Historical documentation at the National Aeronautics and Space Administration's (NASA) John F. Kennedy Space Center (KSC) in Brevard County, Florida, demonstrated that federal agencies with a large and complex set of historic properties can proactively navigate compliance with federal historic preservation mandates. Over the last 15 years or so, the KSC CRM [Cultural Resource Management] office has completed extensive historic resource surveys, public history outreach efforts, and nearly 30 HABS/HAER [Historic American Buildings Survey/Historic American Engineering Record] documentation reports, many completed well ahead of any federal undertaking triggering Section 106 compliance. In a move that is somewhat unusual for federal agencies, all of NASA KSC's historic resource survey reports and mitigation documents have been made publicly available through the CRM office's website.

> NASA KSC's public history outreach efforts have extended beyond the [C]enter's history of [spaceflight] to include working with the North Brevard Heritage Foundation to salvage the historic Clifton Schoolhouse for restoration and preservation. The achievements made by the KSC CRM office are especially remarkable given that the CRM officers at the facility are not CRM professionals, yet they have consistently supported and produced high-quality work that has earned accolades from NASA [H]eadquarters in Washington, D.C., and from the Florida SHPO [State Historic Preservation Office]. The depth and breadth of their work at NASA KSC has gone above and beyond simply complying with historic preservation laws, and has ensured that the agency's distinguished history of space exploration is preserved as it moves forward with plans for spaceflight in the twenty-first century.

Marshall Space Flight Center (MSFC)

By Brian Odom

Over the past year, the MSFC History Office has hosted three exceptional interns. A major goal of the program is to provide undergraduate and graduate students with a meaningful and realistic work experience that will be beneficial to both students and the office. The following three individuals conducted a range of tasks in the History Office, demonstrating skills that will certainly assist them when they complete their degrees and enter the job market. They certainly did a great job helping us work through our large backlog of archival collections and provided valuable assistance with our oral history projects.

Stuart Simms, a history major from Mississippi State University, says his internship has provided him with insight on the history of science and technological developments in the history of Marshall. Stuart participated with archivist Brian Odom on several oral history projects on the development of the Chandra X-ray Observatory at Marshall. Stuart followed up each interview by writing a narrative account that included his research on the historical context. Of his duties in the archive, Stuart remarked, "I have been able to further understand the work involved in the job of public historian here at NASA Marshall Space Flight Center." As part of another history project, Stuart is working with Brian to prepare a paper on the NASA observation campaign of supernova 1987A, as well as the communication of those scientific discoveries.

Shannon Lampton, currently a candidate for a master's degree in history at the University of Alabama in Huntsville, also completed an assortment of tasks during her time in the MSFC History Office. These included the evaluation, arrangement, and preservation of historical photographs; the arrangement and description of an archival collection of Atlas/Agena B Ranger documents; and the conducting of an exceptional oral history interview with a Marshall engineer who worked with the Ares Program. Shannon also fielded a variety of reference questions from the

archivist and assisted with processing a donation of *Marshall Star* newsletters for the archive.

Amy Stone, a candidate for a master's degree in library and information science at the University of Alabama, said working in the MSFC History Office Archives provided her with the opportunity "to explore history and touch the past." According to Amy, "I learned about organizing and describing archival collections by looking at the archival processes from beginning to end." Part of her work involved creating detailed finding aids for individual collections, as well as drafting processing and preservation plans. She was also asked to process and organize a collection of documents related to the Hubble Space Telescope. Additionally, Amy helped create finding aids for a collection of photos and speeches related to the career of former Center Director William R. Lucas.

Stennis Space Center (SSC)

By Daphne Alford

This year marks the 40th anniversary of the John C. Stennis Space Center's site status. On 14 June 1974, then–NASA Administrator Dr. James C. Fletcher announced that the Mississippi Test Facility had been upgraded to the National Space Technology Laboratories (NSTL), a permanent NASA field installation reporting directly to NASA Headquarters in Washington, DC.

The new status reflected the importance of growth in current and future NASA programs that would allow other agencies to have the advantage of the resources available at NSTL.

"NSTL has developed into an installation where highly qualified capabilities exist for conducting remote sensing, environmental, and related research and technical activities," said Fletcher during his announcement. "These capabilities have been enhanced in recent years by the location at NSTL of research and technical activities of several other government agencies. The success of this experiment in the collocation of these mutually supporting activities has led me to decide that NSTL will have a permanent role in NASA's space applications and technology programs."

Created by NASA in 1961 as part of Marshall Space Flight Center in Huntsville, Alabama, the site was first established and used for static testing of the large Saturn V rocket engines used in the Apollo program.

As the Apollo program drew to a close, NASA and several other agencies moved a variety of research and technical activities—primarily related to Earth resources

and the environment—into the modern facilities available at the 13,800-acre site. One thousand contractors and civil servants were employed at the facility.

NASA's activities at NSTL included developmental testing of the Space Shuttle main engine and the Earth Resources Laboratory, which had been established four years earlier. Other agencies located at NSTL during this time included the Departments of Commerce, the Interior, Transportation, and the Army, along with the Environmental Protection Agency, the state of Mississippi, and various other state and university partners from Mississippi and Louisiana.

"By renaming the facility and elevating its status, it is my intention to recognize the importance of NSTL to current and future programs of NASA and to encourage and facilitate the location at NSTL by other government agencies of additional activities which can both benefit from and contribute to the capabilities which exist there," Fletcher said.

Nearly one year to the day after Fletcher's announcement, the first Space Shuttle main engine achieved ignition, marking the beginning of more than 30 years of successful Space Shuttle main engine testing by the site.

Eleven months after the Mississippi Test Operations became the National Space Technology Laboratories, the first static test-firing of the Space Shuttle main engine on the A-1 Test Stand was conducted on 19 May 1975.

Visitors from Huntsville, Alabama, view the first Space Shuttle main engine in NSTL Building 3202. The first Space Shuttle main engine achieved ignition on 12 June 1975 and was fired for a full duration, without an early shutdown, on 24 June.

More Sad Farewells at Langley

By Caroline Diehl, NASA Langley Research Center

Construction of the tunnel complex in 1940. At the far left is the original National Advisory Committee for Aeronautics (NACA) Tunnel One (constructed in 1920). Under construction is the Variable Density Tunnel building (right of Tunnel One), the 24-Inch High Speed Tunnel (tall stack immediately behind it), and the Low-Turbulence Pressure Tunnel circuit to the right. Behind the tunnel circuit is the building that housed the original Two-Dimensional Low-Turbulence Tunnel. Only the former Tunnel One building remains and is now owned by Langley Air Force Base.

NASA Langley Research Center (LaRC) recently completed the demolition of a complex that housed several of its unique and more historically significant wind tunnels. As with the five previous wind tunnel demolitions that have occurred at LaRC since 2008, the complex was demolished due to lack of mission need and outdated technology. The oldest portion of the complex, the building that originally housed the Variable Density Tunnel (VDT), dates to 1923; the newest portion, the Two-Dimensional Low-Turbulence Pressure Tunnel (LTPT), was completed in 1940. All tunnels in the complex were important to early aircraft development and research in airfoil testing.

The largest tunnel in the complex was the LTPT, which had been in operation for nearly 70 years. The tunnel's main drive motor malfunctioned in 2006, and LaRC permanently deactivated the tunnel as there were no funds available to repair it and no future mission need for the tunnel.

Prior to the construction of the LTPT, the largest amount of airfoil data obtained by Langley researchers was from tests performed in the VDT. While the tunnel provided data that agreed with flight-test results for certain airfoil characteristics, such as maximum lift, the levels of drag predicted by tests performed in the VDT were not in agreement with flight tests. Langley researcher Eastman Jacobs recognized that the shortcomings of the data obtained in the VDT were due

to its high airstream turbulence level. Jacobs determined that the geometry of the tunnel was not conducive to low turbulence and that he would need a new low-turbulence wind tunnel in order to pursue his emerging interest in researching new low-drag airfoil shapes known as laminar flow airfoils.

Jacobs's request for the construction of the new tunnel was denied by Langley's management, based in part on doubts over the need for such a facility by noted technical experts at Langley, including Theodore Theodorsen. However, there was a need for a new tunnel to investigate ice formation on aircraft components, as aircraft icing problems were a high priority in the National Advisory Committee for Aeronautics (NACA) mission at that time. Using a clever ploy, Jacobs and Ira H. Abbott jointly designed an atmospheric (unpressurized) "icing tunnel" that had the same dimensions and layout as the desirable low-turbulence tunnel. The Ice Tunnel became operational in 1938, and after several rapid investigations of icing were performed, the tunnel's refrigeration equipment was quickly removed and the tunnel was modified to become the Two-Dimensional Low-Turbulence Tunnel (LTT). Within weeks of its initial operation, the low-cost prototype LTT confirmed the validity of Jacobs's arguments about the detrimental effects of turbulence in wind tunnels. Authorization to build a new pressurized low-turbulence tunnel, to be known as the Two-Dimensional Low-Turbulence Pressure Tunnel, was granted in 1938.

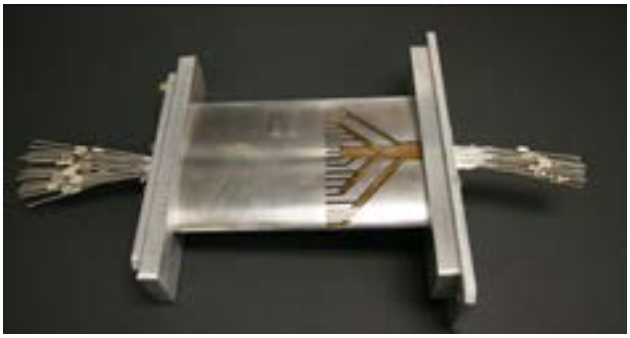
Designed by Jacobs, Abbott, and Edward E. Von Doenhoff, the LTPT was constructed between 1938 and 1940. The political and economic atmosphere during the construction of the tunnel may have influenced the choice of construction materials, as several parts from P-38 aircraft were utilized as components in the tunnel. Twenty unmodified P-38 propeller blades were originally installed in the tunnel; however, it was quickly determined that the blades could not absorb the power of the drive system and added too much turbulence to the airflow. After researchers concluded that the rounded tips of the blades were causing the turbulence, they cut the tips off. The solution was a success, and the modified blades served the LTPT throughout the life of the tunnel.

Modified P-38 blade.

When the LTPT began testing in 1941, it had the lowest turbulence levels of any wind tunnel in the world—less than one-hundredth that of the original VDT. It was also the earliest NACA steel wind tunnel to be built primarily outside of a building, and its basic structural design was utilized for many subsequent wind tunnels at the NACA and NASA.

Initial research in the LTPT focused on development of laminar or low-drag airfoils that were incorporated into many U.S. military aircraft during World War II. The systematic development of this family of laminar-flow airfoils was the principal reason

for the NACA's worldwide reputation in aerodynamics. The data from the LTPT were cataloged by Abbott and Von Doenhoff in a publication that became the "bible" of airfoil information for future generations in the aeronautics community.



Example of typical airfoil.

In 1948, the LTPT was briefly converted for use with Freon, and in 1953, it was modified with slotted walls to permit transonic testing; however, neither of these modifications proved to be successful. After 1955, as flight speeds increased, the apparent need for the LTPT decreased, and the tunnel was placed on standby status as a pressure vessel for the nearby 26-Inch Transonic Blowdown Tunnel and other small, high-speed tunnels in the complex. In the early 1970s, in response to Richard Whitcomb's highly successful research on transonic supercritical airfoils for commercial and privately owned aircraft, the LTPT was reactivated because of interest in the new airfoils.

The LTPT underwent a major rehabilitation between 1979 and 1982 to repair deteriorating tunnel elements and to improve various components necessary for contemporary research. The rehabilitation restored and improved the flow quality required for future laminar-flow research and provided a two-dimensional model support and force balance system for airfoil testing. In addition to performing laminar airfoil testing, the LTPT served out the remainder of its life supporting research for the Space Shuttle, high-lift airfoils, and Gortler vortices, as well as efficiently integrating engines into airframes to improve the performance of commercial and military aircraft.

As has been the case with the demolition of other wind tunnels at NASA LaRC, significant items were salvaged from the LTPT as well as from other tunnels in the complex as a way to mitigate the adverse impacts of demolition and to preserve a tangible history of the unique tunnels. More than 40 airfoil models from the tunnels were sent to two museums and eight school districts for display and for educational purposes. Two modified P-38 fan blades are being incorporated into an outdoor display at LaRC; four fan blades are on loan at the National Institute of Aerospace; and four stone headers displaying the NACA and tunnel names are being incorporated into a display at the VDT exhibit at LaRC. Additional mitigation includes documenting the history of the tunnel complex on the NASA LaRC Cultural Resources Web site at *http://crgis.ndc.nasa.gov/historic/Low_Turbulence_Pressure_Tunnel#Demolition*. The Web site includes history, photographs, virtual tours, a 3D model, research documents, films, and interviews of researchers who worked in the tunnels.

Stone header from LTPT salvaged for future display at LaRC.

For additional information on the LTPT complex, contact Mary Gainer, LaRC Historic Preservation Officer, at *mary.e.gainer@nasa.gov*, or Caroline Diehl, Cultural Resource Management Support Contractor, Straughan Environmental, at *caroline.a.diehl@nasa.gov*.

Retrospective: Curtis Peebles

By Rio H. Phair

My brother, Curtis Peebles, collapsed in August 2013 and was diagnosed with irreversible memory loss. He has not disappeared into a Central Intelligence Agency witness protection program or been flown away in an alien spaceship, although with his sense of humor, I think it would please him if you thought so.

Many people and their families are suffering the consequences of memory loss, but it's particularly sad when the person affected just celebrated his 59th birthday, as is the case for Curtis.

Curt, as he was known to family, spent his adolescence in his bedroom making airplane models and avidly watching televised U.S. space activities on his 19-inch black-and-white RCA television. By the time he graduated from high school, the second bedroom in our parents' small house had become his library, and he was writing and publishing on his way to becoming Curtis L. Peebles, aerospace historian. The library evolved into more than 2,000 books. At the time Curt became ill, he understood the situation and said we would have to sell his house and car, but his biggest concern was the disposal of his books, as he was afraid they would be thrown away. I'm happy to say that his desire for the collection to be taken by an appropriate institution miraculously came true. Libraries don't generally have shelf space or storage for large donations, but the San Diego Air & Space Museum (where Curt belonged to the astronomy club and volunteered as a teen) enthusiastically took the books and will spend a year culling them and adding the chosen volumes to their research library.

Aerospace history and ongoing developments were Curt's greatest interests, and I think his most satisfying years were those he spent in the History Department of the Dryden Flight Research Center (now Armstrong Flight Research Center). Probably his last project before his memory confusion impaired his ability to write and research was an application for naming asteroids after the X-15 pilots. The day preceding the renaming of the Center for Neil Armstrong, a ceremony was held presenting the certificates. Curt's memory was sufficient to enjoy seeing the photos and hearing others acknowledge him as the idea man for the minor planet X-15 pilot naming project.

In closing, I would like to thank all of Curt's colleagues for their care and interest. Their response has helped greatly to ease the sadness and challenges of dealing with my brother's illness.

Other Aerospace History News

National Air and Space Museum (NASM)

By Mike Neufeld

Roger Launius (Space History Division and Associate Director for Collections and Curatorial Affairs) has just published *Historical Analogs for the Stimulation of Space Commerce* (NASA SP-2014-4554, Monographs in Aerospace History, no. 54). This study investigates and analyzes historical episodes in America in which the federal government undertook public-private efforts to complete critical activities valued for their public good. This combination largely resulted from a lack of either sufficient political will to fund them entirely out of the public treasury or insufficient profit motive for private firms to undertake them for purely business reasons. Six case studies illuminate this process. They include the development of the transcontinental railroad, supported by a unique land-grant approach to subsidy; support for the airline industry through legislation, appropriate regulation, and subsidies to grow a robust air transport capability; the regulatory regime put into place with the rise of the telephone industry and the creation of a government-sponsored monopoly; government sponsorship of Antarctic scientific stations that evolved into a public-private partnership over time; the fostering of a range of public works projects and their success or failure over time; and the establishment of scenic and cultural conservation zones in the United States and ways to balance economic development with preservation.

Michael Neufeld (Space History) has published two articles on the history of planetary exploration since 1989: "First Mission to Pluto: Policy, Politics, Science and Technology in the Origins of New Horizons, 1989–2003," *Historical Studies in the Natural Sciences* 44 (2014): 234–276, and "Transforming Solar System Exploration: The Origins of the Discovery Program, 1989–1993," *Space Policy* 30 (2014): 5–12.

On Thursday, 12 June, Margaret Weitekamp and Valerie Neal (Space History) cohosted a two-session program, "Sally Ride: Life Stories," in the Moving Beyond Earth exhibition gallery. They interviewed journalist and author Lynn Sherr about her newly published biography, *Sally Ride: America's First Woman in Space*. NASA TV broadcast one session live and recorded both sessions for further broadcasts. Book signings by Sherr followed each session.

Valerie published *Discovery: Champion of the Space Shuttle Fleet* (Minneapolis, MN: Smithsonian National Air and Space Museum in association with Zenith Press, 2014), an illustrated "biography" of the longest-serving, most-traveled orbiter, now displayed at the Museum's Udvar-Hazy Center in Northern Virginia. The book is available on Amazon.com and in the Museum's gift shops. Valerie also played a key role in organizing the 10th annual John Glenn Lecture, featuring Gemini IV and Apollo 9 commander James A. McDivitt. He spoke on 26 June about human and robotic space exploration and highlights of his careers in the Air Force, NASA, and business.

Call for Entries: SHFG Thomas Jefferson Prize

The Society for History in the Federal Government (SHFG) seeks entries for its 2015 Thomas Jefferson Prize for documentary histories published in 2013 or 2014. The prize recognizes the editor(s) of a single volume or one or more volumes in a project that contributes significantly to the understanding of the history of the federal government. The prize will be awarded at the SHFG annual meeting in spring 2015. See *http://www.shfg.org* for a list of past winners and general requirements for all SHFG prizes.

In addition to the general requirements, entries for the 2015 Jefferson Prize will be judged on the editorial methodology employed, including accuracy of transcription, relevance and usefulness of annotation, selection and arrangement of documents, and indexing. Electronic documentary editions will also be evaluated for solid technological capabilities and performance, high quality of design, and innovative strategies or techniques.

A copy of each entry with a letter briefly stating its qualifications and merits should be sent to each of the Jefferson Committee members by **1 November 2014**:

1. Richa Wilson, U.S. Forest Service Intermountain Region, 324 25th Street, Ogden, UT 84401

2. Jennifer Ross-Nazzal, Ph.D., 2003 Seakale Lane, Houston, TX 77062

3. Alisa Whitley, United States Marine Corps Archives, 2040 Broadway Street, Quantico, VA 22134

The SHFG, founded in 1979, is a nonprofit professional organization that promotes the study and broad understanding of the history of the United States Government. It also serves as the voice of the federal historical community. The Thomas Jefferson Prize commemorates the third President of the United States and the author of the Declaration of Independence, who was a firm believer in the study of history and the preservation of historical records.

Battlefield Cosmos: The Militarization of Space, 1942–1990

By Tom Reichard, Freie Universität Berlin (*tom.reichard@fu-berlin.de*)

The dawn of the Space Age was marked by a military operation. On 3 October 1942, an A4 rocket, later known as the V-2, launched from the Peenemünde Army Research Center in Northern Germany, reached an altitude of 84.5 kilometers, and became the first humanmade object to breach what was regarded as the boundary of outer space. From its inception, spaceflight was closely intertwined with rocketry, embodying the now-familiar dual-use character of space technology. The coalescence of space exploration and the military was not limited to actual spaceflight; it also applied to scientific research and unrealized ventures into outer space, as well as to fictional works about cosmic battles and alien encounters.

Covering the period from the 1940s to the end of the Cold War in the early 1990s, the "Embattled Heavens: The Militarization of Space in Science, Fiction, and Politics Conference" was held by Freie Universität Berlin in April 2014; it set out to realign perspectives on the Cold War and the Space Age. The conference chose an interdisciplinary approach to investigate the military in the history of outer space in three closely intertwined fields of study: science, fiction, and politics.

Space provided a place for the spatial expansion of human conflict; at the same time, it affected the way conflicts on Earth were conceived. After two disastrous world wars and the ensuing formation of a global age, the infinity of outer space equally provided the background for scenarios of sustained and perpetuated conflict, the ultimate threat of universal destruction, and a quest for transcendence. The specter of nuclear war and the worldwide divide between two rival superpowers led to global fears of destruction. Having undergone several transformations, the militarization of space made possible the onset of an age in which getting lost became increasingly difficult and avoiding surveillance almost impossible. With the ever-growing impact of commercial space technologies and satellites on the everyday life of millions of people around the globe, an end to the military dimension of outer space is not in sight.

For a detailed program, abstracts of all presentations, and biographical information on all speakers, please consult *http://www.heavens.geschkult.fu-berlin.de*.

Recent Publications and Online Resources

NASA Publications

Archaeology, Anthropology, and Interstellar Communication, edited by Douglas A. Vakoch (NASA SP-2013-4413, 2014). Addressing a field that has been dominated by astronomers, physicists, engineers, and computer scientists, the contributors to this collection raise questions that have been overlooked by physical scientists about the ease of establishing meaningful communication with an extraterrestrial intelligence, given humanity's often dismal attempts to communicate with other cultures during first encounters. This book is available as a free download at *http://www.nasa.gov/connect/ebooks/archaeology_anthropology_and_interstellar_communication.html*.

Historical Analogs for the Stimulation of Space Commerce, by Roger D. Launius (NASA SP-2014-4554, 2014). These case studies explore six historical episodes of government support for commercial activities. This book is available as a free download at *http://www.nasa.gov/connect/ebooks/historical_analogs_detail.html*.

Aeronautics and Astronautics: A Chronology, 2010, by Meaghan Flattery (NASA SP-2013-4037, 2014). This book is available only as a free download at *http://history.nasa.gov/sp4037.pdf*.

Commercially Published Works

Compiled by Chris Gamble

Bold They Rise: The Space Shuttle Early Years, 1972–1986, by David Hitt and Heather R. Smith (University of Nebraska Press, June 2014). This book tells the story of the Space Shuttle through the personal experiences of the astronauts, engineers, and scientists who made it happen—in space and on the ground, from the days of research and design, through the heroic accomplishments of the program, to the tragic last minutes of Challenger. In the participants' own voices, we learn that to which so few are privy: what it was like to create a new form of spacecraft, to risk one's life testing that craft, and to witness a friend's death. A "guided tour" of the Shuttle—in historical, scientific, and personal terms—this book provides a fascinating, richly informed, and deeply personal view of a feat without parallel in the human story.

History of Rocketry and Astronautics, vol. 41, edited by Kerrie Dougherty, American Astronautical Society (AAS) History Series, vol. 41, International Academy of Astronautics (IAA) History Symposia, vol. 30 (AAS/Univelt, Inc., June 2014). These are the proceedings of the 44th History Symposium of the International Academy of Astronautics held in Prague, Czech Republic, in 2010.

The ITU and Managing Satellite Orbital and Spectrum Resources in the 21st Century, by Audrey L. Allison (Springer, May 2014). Access to satellite orbits and spectrum is managed by the International Telecommunication Union (ITU), a United Nations body that strives to extend the benefits of new technologies to the world while ensuring equitable access to these resources. This book explores how the ITU approaches these dual missions in light of the increasing saturation of the geostationary orbit by the global satellite industry and the rising interests of developing countries in accessing these limited resources. These issues were the subject of debate at the 2012 World Radiocommunication Conference. This book describes and assesses various regulatory approaches undertaken to manage the increasing requests for access to space and especially access to spectrum and orbital locations in the geosynchronous or "Clarke" orbit.

Milestones of Space: Eleven Iconic Objects from the Smithsonian National Air and Space Museum, edited by Michael J. Neufeld (Zenith Press, May 2014). In this book, Michael Neufeld and select curators of the Smithsonian National Air and Space Museum (NASM) present a gorgeous photographic celebration of some of the most groundbreaking artifacts that played key parts in giving humanity its first steps into the cosmos. The NASM curators feature each object in incredible detail with compelling timelines, sidebars and captions, and over 150 archival images that provide new and little-known insights into their development and historical context.

No Requiem for the Space Age: The Apollo Moon Landings and American Culture, by Matthew D. Tribbe (Oxford University Press, June 2014). Why did support for the space program decrease so sharply by the early 1970s? Rooted in profound scientific and technological leaps, rational technocratic management, and an ambitious view of the universe as a realm susceptible to human mastery, the Apollo Moon landings grandly manifested postwar American progress and seemed to prove that the United States could accomplish anything to which it committed its energies and resources. Shifting the conversation of Apollo from its Cold War origins to larger trends in American culture and society and probing an eclectic mix of voices from the era, including intellectuals, religious leaders, rock musicians, politicians, and a variety of everyday Americans, Matthew Tribbe paints an electrifying portrait of a nation in the midst of questioning the very values that had guided it through the postwar years as it began to develop new conceptions of progress that had little to do with blasting ever more astronauts to the Moon.

Range Wars: The Environmental Contest for White Sands Missile Range, by Ryan H. Edgington (University of Nebraska Press, July 2014). Established in south-central New Mexico at the end of World War II, White Sands Missile Range is the largest

overland military reserve in the Western Hemisphere. It was the site of the first nuclear explosion, the birthplace of the American space program, and the primary site for testing U.S. missile capabilities. In this environmental history of White Sands Missile Range, the author traces the uneasy relationships between the military, federal government, local ranchers, environmentalists, state game and fish personnel, biologists and ecologists, state and federal political figures, hunters, and tourists after World War II—as they all struggled to define and productively use the militarized western landscape. Environmentalists, ranchers, tourists, and other groups joined together to transform the meaning and uses of this region, challenging the authority of the government to dictate the environmental and cultural value of a rural American landscape. As a result, White Sands became a locus of competing geographies informed not only by the far-reaching intellectual, economic, and environmental changes wrought by the Cold War, but also by regional history, culture, and traditions.

The Rise and Fall of COMSAT: Technology, Business and Government in Satellite Communications, by David Whalen (Palgrave Macmillan, May 2014). The author explores the factors that contributed to the rise and fall of the Communications Satellite Corporation (COMSAT), a company that created the industry. Today, satellite communications gross over $100 billion annually and are heading toward $200 billion. COMSAT started the business of satellite communications in 1963, when it was organized in compliance with the Communications Satellite Act of 1962. COMSAT chose geosynchronous Earth orbit, formed the International Telecommunications Satellite Organization (INTELSAT), and generally promoted the technological change that saw satellite power increase and Earth station antennas reduced from 30 meters to 1 meter. After pioneering this technology and growing the market, COMSAT fell prey to changes in government policy and to its own lack of entrepreneurial talent.

Sally Ride: America's First Woman in Space, by Lynn Sherr (Simon & Schuster, June 2014). This biography of Sally Ride, America's first woman in space, features exclusive insights from Ride's family and partner.

Tourists in Space: A Practical Guide, 2nd ed., by Erik Seedhouse (Springer, June 2014). This book updates the first edition with the new players in the field, comprehensive medical information about spaceflight health requirements, and a thorough explanation of the current drivers of the new space frontier. Soon—very soon—you'll be able to add a much more exotic stamp to your passport: space. How will you get there, what will the trip be like, and how much training will you need? This definitive, real-world guide is packed with helpful facts and suggestions on everything from training, equipment, safety, and in-flight procedures to techniques for avoiding space motion sickness and bone demineralization.

Why Mars: NASA and the Politics of Space Exploration, by W. Henry Lambright, New Series in NASA History (Johns Hopkins University Press, May 2014). Since NASA's establishment in 1958, the Agency has looked to Mars as a compelling prize, the one place beyond the Moon where robotic and human exploration

could converge. Remarkably successful with its roaming multi-billion-dollar robot, Curiosity, NASA's Mars program represents one of the Agency's greatest achievements. This book analyzes the history of the robotic Mars exploration program from its origins to today. The author examines the politics and policies behind NASA's multidecade quest, illuminating the roles of key individuals and institutions along with their triumphs and defeats.

The History Program Office gives sincere thanks to volunteer Chris Gamble, who compiles this section for us every quarter. Please note that the descriptions have been derived by Chris from promotional material and do not represent an endorsement by NASA.

Upcoming Meetings

The 65th International Astronautical Congress will be held **29 September–3 October 2014** in Toronto, Canada. Visit *http://www.iac2014.org* for details.

The annual meeting of the Oral History Association will be held **8–12 October 2014** in Oklahoma City, Oklahoma. Visit *http://www.oralhistory.org/annual-meeting/* for details.

The annual meeting for the Society for the History of Technology will be held **6–9 November 2014** in Dearborn, Michigan. Visit *http://www.historyoftechnology.org/annual_meeting.html* for more details.

The annual meeting for the History of Science Society will be held **6–9 November 2014** in Chicago, Illinois. Visit *http://www.hssonline.org/Meeting/* for more details.

The 46th fall meeting of the American Geophysical Union will be held **15–19 December 2014** in San Francisco, California. Visit *http://fallmeeting.agu.org/2014/* for details.

The annual meeting of the American Historical Association will be held **2–5 January 2015** in New York, New York. Visit *http://www.historians.org/annual/next.htm* for more details.

The 225th meeting of the American Astronomical Society will be held **4–8 January 2015** in Seattle, Washington. Visit *http://aas.org/meetings/* for details.

The American Institute of Aeronautics and Astronautics' SciTech 2015 will be held **5–9 January 2015** in Kissimmee, Florida. Visit *http://www.aiaa-scitech.org/* for details.

The midwinter meeting of the American Library Association will be held **30 January–3 February 2015** in Chicago, Illinois. Visit *http://www.ala.org/conferencesevents/midwinter-meeting* for more details.

The 19th Annual Space Exploration Educators Conference will take place on **5–7 February 2015** at the Space Center Houston in Houston, Texas. Visit *http://spacecenter.org/education-programs/teacher-programs/teachers-seec/* for more details.

Fred Ordway: An Appreciation

By Bill Barry

In one respect, you could say that I'd known Fred Ordway for most of my adult life. Having read and reread *The Rocket Team*, which Fred cowrote with Mitchell Sharpe in 1979, it was easy to imagine that I knew something of the author. It was certainly clear to me, even then, that he had a deep-seated passion for space exploration and a powerful belief in his former boss and mentor, Wernher von Braun. But I really didn't get to know Fred until four years ago, when I became Chief Historian.

Since Fred's death on 1 July, there have been numerous glowing obituaries that discuss his life and accomplishments. The major newspapers of record all reported on his passion for spaceflight, his association with von Braun, and his role as technical advisor to the movie *2001: A Space Odyssey*. There are also insightful and touching tributes to Fred in a variety of magazines and online. (The British Interplanetary Society's September issue of *Spaceflight* has a particularly nice piece by John Becklake.) We even posted a short obituary on the NASA History Facebook page.

I first bumped into Fred at a NASA History event here in Washington, though I don't recall which one. He would appear at these events, ask interesting questions, and chat amiably with whomever he happened to be near. But he was so unprepossessing that I probably would never have realized who he was if Nadine Andreassen hadn't introduced us. As our occasional history speaker program morphed into a regular quarterly event, I found out that Fred would try to plan his trips to Washington to coincide with our speakers. He was that much of a fanatic about space history. Nadine, of course, made sure that he knew our schedule. She also helped convince Fred to be our first quarterly speaker for 2014. As many of you know, Fred spoke on his work with Stanley Kubrick on the movie *2001* and shared some rare video and pictures. While Fred was not laying claim to any of the credit for the movie, it was clear from his talk that much of the depth of reality in that movie came from his fertile imagination and attention to detail. (For example, he actually wrote the detailed directions for using the zero-g toilet that got a very brief moment on screen.)

One of the things I enjoyed most about Fred's visits to Washington in the last few years was the chance we had for one-on-one conversations. On several occasions, Fred invited me to join him for breakfast at one of his favorite haunts in town, the Cosmos Club. Our discussions would range from his collection of pulp science fiction (donated to the library of his alma mater, Harvard), to his father's World War I flying career (Fred's namesake had volunteered to fly for the Royal Canadian Air Force before the United States joined the war), to the latest news, to the early days of the American Rocket Society (now the AIAA) and the International Astronautical Federation (IAF), to his early meetings with Soviet space scientists (often at IAF meetings). He spoke often, and with great affection, about his family and friends. His devotion to his wife Maruja was especially touching—and almost painful to behold after she passed away two years ago. His loyalty to von Braun was also notable—and, to me, a bit awkward. Fred seemed truly baffled that others could see von Braun as anything other than a space visionary. This was not something unique to his old boss, for Fred always seemed to see the best in his fellow human beings and in our future. In my all-too-short friendship with Fred, what struck me most about him was not his many accomplishments, but his humanity. He was a gentleman of the type that is all too rare these days. I miss him. Godspeed, Fred.

Fred Ordway (conspicuous in his tennis whites) talks with (left to right) astronaut Deke Slayton, author Arthur C. Clarke, director Stanley Kubrick, and NASA Associate Administrator for Manned Space Flight George Mueller on set.

The NASA History Program Office, under the Office of Communications, NASA Headquarters, Washington, DC 20546, publishes *News and Notes* quarterly.

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