

# NEWS & NOTES

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National Aeronautics and  
Space Administration



## FROM THE CHIEF HISTORIAN



The centennial of the creation of the National Advisory Committee for Aeronautics (NACA) may have come on 3 March and may seem to be long gone by now, but the NASA History Program is still busy working to mark the occasion. Throughout this calendar year, we will continue to add content to our Web site, produce NACA social media (look for the hashtag #NACA100), and create NACA centennial publications.

The big history event for the centennial was, of course, the symposium cohosted by our friends at the National Air and Space Museum on 3–4 March 2015. We owe a huge debt of thanks to the museum for the great hospitality they showed, as well as to the many staff (from NASA and the museum) and volunteers who made sure the symposium went off smoothly. It was an excellent event that featured a wide variety of papers on various aspects of NACA history. If you weren't able to make it and couldn't tune in online, don't worry. The whole Webcast has been archived on the NASA YouTube channel. You can

*continued on next page*

## CHASING A VISION FROM 1937: THE CIVILIAN CONSERVATION CORPS AT LANGLEY FIELD

By Mary Gainer, Historic Preservation Officer at NASA Langley Research Center

Sometimes, old photographs open up a previously forgotten chapter of history and provide insight into current problems. Such was the case with an old aerial photograph of what became NASA Langley Research Center (LaRC). The mystery took almost two years to solve.

A few years ago, LaRC obtained a 1937 aerial photograph from Langley Air Force Base of what was then Langley Field. Although the image was acquired as part of a search for a cemetery associated with a colonial plantation, an unusual configuration of buildings was noted. They appeared to be barracks of some sort, but the Air Force history office had no record of them. Since they had no relevance to the project, the search stopped there.

Fast-forward to 2014. LaRC is in the process of conducting an inventory of the archives collection. The archives room stores documents that have been collected for almost a hundred years—many of which have probably not seen the light of day in at least half that time. Buried in this treasure was about 4 linear feet of blueprints of what was assumed to be

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*From the Chief Historian (continued)*

find the opening remarks and keynote speech at this link: <http://youtu.be/LLXybmBZtMs>. Links to the other panels can also be found on that page. Because of the then-pending overhaul of the NASA.gov Web site, we were not able to gather all of the symposium materials in one place right after the event. But keep your eye on [http://www.nasa.gov/naca\\_symposium](http://www.nasa.gov/naca_symposium). Now that the NASA.gov overhaul is complete, we'll be using the symposium site as an online archive. Also, I'm very pleased to note that renowned aerospace historian Dick Hallion has agreed to serve as editor for the book of selected papers from the symposium. Expect to see that in the next year.

We have two more NACA centennial publications in the works for this year. The first of those is *Emblems of Exploration*, a monograph written for us by Joe Chambers. You may recall reading Joe's two-part article in *News & Notes* in 2013 on the origin of the NASA "meatball." Joe has expanded that research to cover the logos and insignia used by both the NACA and NASA over the last century. It is a story chock-full of surprises. Did you know, for example, that the NACA wings logo appeared on the first building built at Langley but did not become the official insignia until 1941? The story will be heavily illustrated with photographs, many of which have been lying unseen in the archives for decades. The other major centennial publication in work is a book we're calling *NACA and NASA at the Century Mark*. Written for us by Roger Launius, this will be a brief history of the Agency aimed at the general reader, new employees, government officials, and

others looking for an understanding of the broad sweep of NACA/NASA history and the key themes that have played out since 1915. For those of you who recall *Orders of Magnitude* in its various incarnations since 1976, Roger's book will serve as the latest update in that series.

**“THE WAR WAS A WATERSHED IN NACA HISTORY, YET THERE IS PRECIOUS LITTLE WRITTEN ABOUT IT... WHILE WE DID GET SOME DISCUSSION ON THIS TOPIC AT THE SYMPOSIUM, THE CONSENSUS OF OPINION AMONG THE SYMPOSIUM PARTICIPANTS WAS THAT FEW HISTORIANS HAVE LOOKED INTO THIS PERIOD IN NACA HISTORY.”**

While I've been thrilled about all of our NACA centennial activities, I do have to admit to one disappointment from the symposium. This is the fact that we had no paper proposals on the role of the NACA in World War II. The war was a watershed in NACA history, yet there is precious little written about it other than some immediate postwar homages that were (perhaps unsurprisingly) free of many key details. While we did get some discussion on this topic at the symposium, the consensus of opinion among the symposium participants was that few historians have

looked into this period in NACA history. Originally, many of the key records of that period would have been classified, but now they are available for research. To encourage original scholarship in this area, we are considering a followup symposium on the NACA in World War II. If you have any suggestions along these lines, I'd love to hear them.

In the meantime, Godspeed,

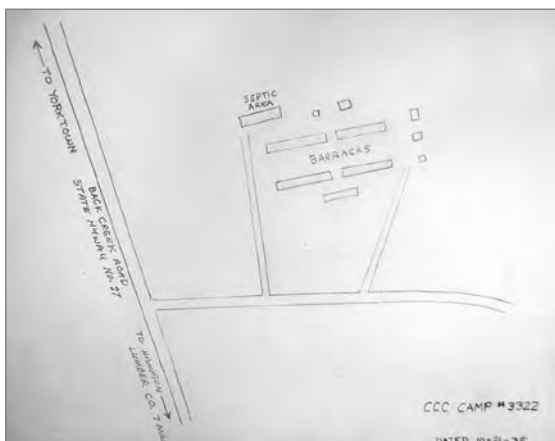


**William P. Barry**  
Chief Historian



*Chasing a Vision from 1937: The Civilian Conservation Corps at Langley Field (continued)*

The cemetery that started it all is the cleared rectangle on the right of photo. To the left is the unusual configuration of buildings later identified as a Civilian Conservation Corps (CCC) camp.



Pictured is a hand-drawn copy by Benjamin Goddin of the 1935 blueprint showing barracks of CCC Camp #3322.

such mundane things as floor plans of the old National Advisory Committee for Aeronautics (NACA) buildings. It turned out that there were several surprises in this collection, one of which was a hand-drawn map of buildings matching the configuration seen on the 1937 aerial photograph. The drawing was labeled “CCC [Civilian Conservation Corps] Camp.”

That piece of information sparked research into the role the CCC had had at Langley Field. On 24 May 1933, Langley Field received its first contingent of CCC men. It is recorded that approximately 1,200

men arrived by boat from Fort Hunt, which had been a temporary camp for veterans. Once they arrived at Langley, the men lived in hangars and empty warehouses. They established a tent camp on one side of the field.<sup>1</sup> It was typical of these temporary communities to initially live in Army tents prior to constructing barracks to house 50 men each, as well as other support buildings.<sup>2</sup> At least one company at Langley Field was black, although records have not been found on how the camp was integrated. On 2 July 1933, Company 1351 from the Langley Field arrived in Vermont to work on a flood-control project, and surprised locals noted that “most of the children had never seen a colored man before.”<sup>3</sup>

Fort Hunt, on the grounds of Mount Vernon, had defended the Potomac River during the Spanish American War. During the Depression, it served as a short-term veterans’ camp for those who had been lobbying for payment of their World War I bonuses.<sup>4</sup> The government’s long-term solution was to convince the men to join the CCC. On 5 April 1933, Franklin D. Roosevelt signed Executive Order 6101, the Emergency Conservation Work Act, better known as the CCC. The amended order allowed for the enrollment of 25,000 veterans in separate reforestation camps. Langley Field was one of three camps to which they were sent. Langley Field was known as the Forest Conservation Conditioning Camp.<sup>5</sup> Men were

1 Maurer Maurer, *Aviation in the U.S. Army, 1919–1939* (Washington, DC: Office of Air Force History, 1987), p. 348, available online at <http://www.afhso.af.mil/shared/medial/document/AFD-100923-007.pdf>.

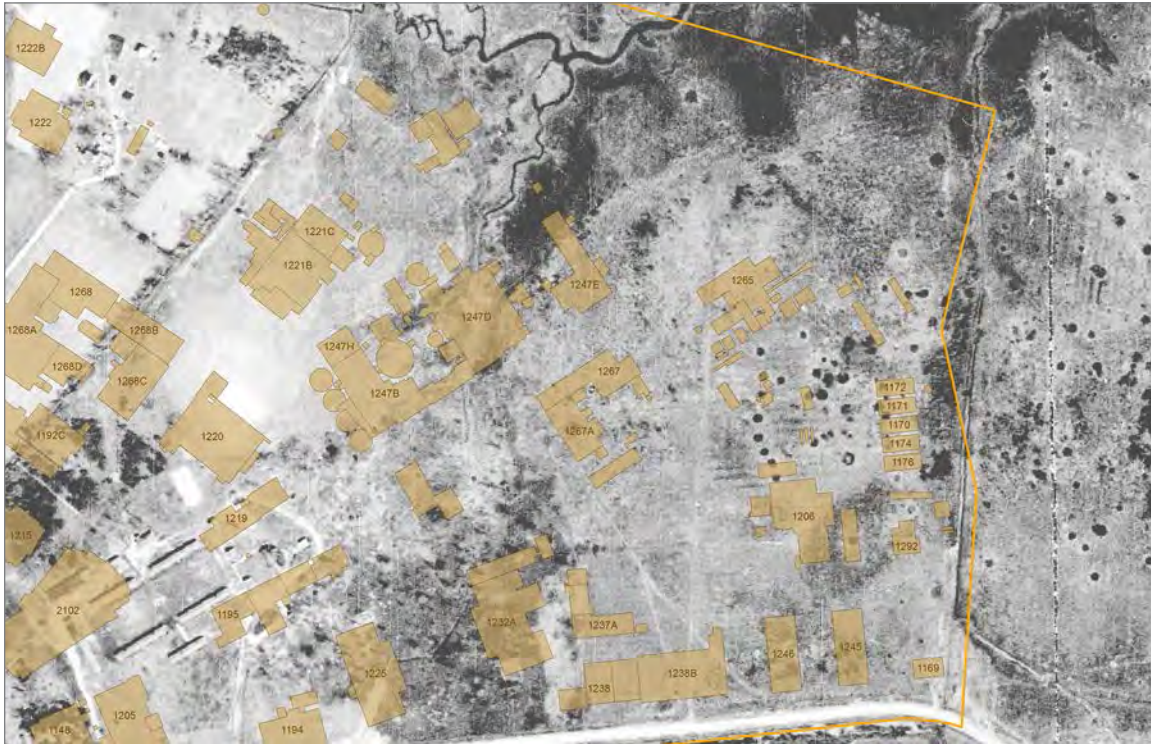
2 “Civilian Conservation Corps,” Wikipedia, available online at [http://en.wikipedia.org/wiki/Civilian\\_Conservation\\_Corps](http://en.wikipedia.org/wiki/Civilian_Conservation_Corps).

3 Thomas W. Patton, “When the Veterans Came to Vermont: The Civilian Conservation Corps and the Winooski River Flood Control Project,” *Vermont History* 73 (2005): 167, available online at [https://vermonthistory.org/journal/73/06\\_Patton.pdf](https://vermonthistory.org/journal/73/06_Patton.pdf).

4 “When the Veterans Came to Vermont”: 163.

5 *Ibid.*, p. 164.





A wider view of the 1937 aerial photograph shows a portion of the pockmarked landscape to the east of the CCC camp. Also shown is an overlay of NASA Langley Research Center’s boundary (line on the right side) and current buildings. The camp lies in the center of the new core, adjacent to the recently completed Integrated Engineering Services Building (2102).

sent here for about a month prior to moving on to an actual work camp.<sup>6</sup>

In 1935, the program was expanded and the focus began to change. The camp at Langley Field also changed. From 1935 to 1937, Company Number 3122 was engaged in Project Army 2 at Langley Field.<sup>7</sup> Their primary responsibilities were to enlarge and develop the flying field, make drainage improvements, construct fire trails, provide general

landscaping and reforestation crews, and construct erosion-control measures.<sup>8</sup>

“Loose lips sink ships” is a saying that has ties to this site as well. In the 1930s, there is evidence that the CCC men were enlisted to test chemical weapons. Investigations at the American University Experiment Station (AUES) link that site with Langley Field. The AUES was the site of the second largest chemical weapons facility in the world. Researchers tested approximately 400 substances by dropping shells or

6 Joseph M. Speakman. *At Work in Penn’s Woods: The Civilian Conservations Corps in Pennsylvania*. (University Park, PA: Penn State University Press, 2006), p. 29.

7 *Civilian Conservation Corps Legacy*, available online at [http://www.ccclegacy.org/CCC\\_Camps\\_Virginia.html](http://www.ccclegacy.org/CCC_Camps_Virginia.html).

8 Legacy Resources Management Program, “Nationwide Context, Inventory, and Heritage Assessment of Works Progress Administration and Civilian Conservation Corps Resources on Department of Defense Installations,” 2009, available online at <http://www.denix.osd.mil/crl/upload/07-357-Tech-Report-Part-3-of-8.pdf>.



bombs and releasing large quantities into the air and soil to study the effects on animals. When Ordnance Department funding was cut in the 1930s, they used funding through the Civil Works Administration to continue chemical weapon testing and disposal projects. In addition to Langley's participation in the field tests, the contingency plan for the Chemical Warfare Service provided for personnel and materials to be placed at the Langley Field CCC camp.<sup>9</sup> Evidence of

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**'LOOSE LIPS SINK SHIPS' IS A SAYING THAT HAS TIES TO THIS SITE AS WELL. IN THE 1930s, THERE IS EVIDENCE THAT THE CCC MEN WERE ENLISTED TO TEST CHEMICAL WEAPONS.** ”

this is apparent in the 1937 aerial photograph showing the typical pockmarked landscape—indicative of bombing—to the east of the camp.

This final information linking the site to the AUES may have a current significance. The AUES was especially known for its use of mustard gas and arsenic, particularly arsine gas shells

shipped off-site as a solid arsenical. Recently, soil tests in the area of Tabbs Creek, just to the north of the bombing site, had extremely low levels of arsenic that could not be associated with testing at NASA. Although not documented, it could be that this is yet another link to the CCC camp and the projects with which its employees were associated.

9 Richard Albright, *Cleanup of Chemical and Explosive Munitions: Locating, Identifying Contaminants, and Planning for Environmental Remediation of Land and Sea Military Ranges and Ordnance Dumpsites* (Norwich, NY: William Andrew, Inc., 2008), available online at <http://www.sciencedirect.com/science/book/9780815515401>.

## NEWS FROM HEADQUARTERS AND THE CENTERS

### NASA HEADQUARTERS

Washington, DC

#### History Program Office

By Bill Barry

During the third week of May (while this publication is going to press), folks involved in history and archival programs at NASA met at Stennis Space Center, Mississippi, in a Program Review. With sequestration and the coincident restrictions on travel and meetings that followed in the wake of the scandal surrounding a Government Services Administration (GSA) “conference,” we haven’t had

an annual Program Review since we met at Glenn Research Center in November 2011. While quarterly teleconferences have been helpful in keeping in touch, there really is no substitute for the kind of exchange you get in a two-day face-to-face meeting. We hope to reestablish a regular schedule for these reviews in the years ahead, but for this year, we have an especially important job. We will be discussing a draft NASA Policy Directive (NPD) for the History Program. While there have been guiding policies for the program from 1960 through the mid-1990s, the (then) NASA Management Instruction for the History Program was eliminated (along with a lot of other Headquarters policy guidance) around 1996. In light of changes



over the last 20 years, it is important that we codify what the History Program can and should do and how our work relates to many other functions (which have written guidance of their own), like records management, the Scientific and Technical Information (STI) Program, cultural resources management, etc.... So by the time you read this, we will have met to discuss these issues and to share our mutual concerns and experiences with doing the day-to-day work of archival and history support for NASA. My thanks to our hosts at Stennis and to our own Nadine Andreassen, who has been tackling all of the logistical and scheduling challenges for us at Headquarters.

While the NACA centennial and preparation for the Program Review have kept us hopping this spring, we've also been busy with several other challenges. The overhaul of *www.nasa.gov* did not directly impact our stand-alone history Web site (<http://history.nasa.gov>), but the strain that the Agency Web site conversion put on the supporting information technology (IT) contractors has meant that we've had to put our plans to update <http://history.nasa.gov> on hold. We hope to get back to that in the coming months. In the meantime, thanks to the connections and hard work of our editor Yvette Smith (she used to work on the *www.nasa.gov* Web team), the new *www.nasa.gov* site has a much-improved history page (see <http://www.nasa.gov/history>). We've also been involved in some interesting developments on the history front at Goddard Space Flight Center—but I'll leave it to Jane Odom (who has been doing the hard work on this) to explain that below. We also continue with our many publication projects. In addition to the centennial publications mentioned in the "From the Chief Historian" column, we've got a number of other publications targeted for release this year. These include the long-delayed societal impact case studies volume, two more chronologies (2011 and 2012), an update to our 1997 monograph on spacewalks (*Walking to Olympus*), and Steve Garber and Glen Asner's book on the development of the Vision for Space Exploration (entitled "Untethering Spaceflight").

Perhaps our most amazing publication accomplishment of the last year is catching up on the backlog of Aeronautics and Space Reports of the President. Thanks to herculean efforts by Giny Cheong and Steve Garber (and cooperation from many people across the Executive Branch), we have not only caught up with the backlog, but now have a process in place that will allow us to assemble this report within eight months of the completion of the fiscal year. We did the catching up while simultaneously proving that the eight-month schedule would work. For the first time in a long time, the report will be delivered to Congress on schedule, and we'll have a couple of months without a pending "President's Report" in work. It won't be a long break, though. Work on the fiscal year 2015 report will kick off later this summer. When it does, Giny will no longer be leading the charge. She has decided to take on some new challenges and is moving on to a new job. She does so with our eternal thanks and appreciation.

As is usual for this time of year, we also had to say goodbye to our spring interns and welcome a new set of summer interns. Shelby Jirikils was with us from January through March before returning to the University of California, Irvine. Rachael Kirschenmann (Nebraska Wesleyan University) started in February and was with us through the middle of May. The two of them were an incredibly prolific and creative pair and have done wonders for our social media accounts, as well as helping out with all of the other things that have kept us so busy this spring. On 1 June, we welcomed both Warren Dennis (a senior at Colgate University) and Melissa Joskow (a sophomore at Wesleyan University). They'll be with us through the start of August.

### Historical Reference Collection (HRC)

By Jane H. Odom

In the Headquarters Archives, the staff continues to stay busy with reference requests and with processing (arrangement and description) of collections. During the last quarter, we hosted visitors from



NASA Headquarters and Ames Research Center, the National Air and Space Museum, the Naval Research Laboratory, the Planetary Society, American University, Syracuse University, George Washington University, Sterling College in Kansas, and Auburn University, as well as independent researchers from Indiana and Arizona. Additionally, we hosted a foreign visitor from Tel Aviv University.

Recently, several archive projects have been completed that researchers will find of interest. Processing has been completed on a 12-cubic-foot collection of astrophysics material, circa 1979–2002. These boxes were collected and assembled by Alan Bunner, former theme scientist in the Structure and Evolution of the Universe program within the Office of Space Science. The materials are arranged alphabetically by subject. There is information on missions such as the Advanced X-ray Astrophysics Facility (AXAF—later renamed Chandra), Gravity Probes, the Herschel Space Observatory, Planck, and the Wide-field Infrared Survey Explorer (WISE). The collection contains correspondence, proposals, presentations, design studies, and budget materials. There are also space science mission booklets that include the scientific purpose of the mission and correspondence regarding the appointment of principal investigators for various space science missions. Additionally, there are notes and details about astrophysics-related symposia and conferences, as well as advisory committee activities.

A review of four boxes on loan to us from the Federal Records Center that contain Space Exploration Initiative materials is complete. After an appraisal, dozens of documents were copied and added to existing subject files in the HRC, making our collection that much richer for researchers.

Bill and I have been working closely with Goddard Space Flight Center and Langley Research Center officials recently—with the former to establish a new archival program at the Center and with the latter in preparation for an upcoming building (and archive) renovation.

If you are interested in visiting the HRC to conduct research on the subject areas mentioned above or in exploring other topics, please contact us by phone (202-358-0384) or online at <http://history.nasa.gov/contact.html> to schedule an appointment. To search our electronic documents collection, see <https://historydms.hq.nasa.gov/>.

## AMES RESEARCH CENTER (ARC)

### Moffett Field, California

By Glenn Bugos

NASA Ames had decided that for 3 March, the centenary of the founding of the National Advisory Committee for Aeronautics (NACA), the focus would be on the activities in Washington, DC. Our Center Director, Pete Worden, was at the celebrations in Washington to present a proclamation to NASA from the Assembly of California congratulating the Agency on how it has maintained the legacy of the NACA. Glenn Bugos presented a paper entitled “The NACA Transition to Space: Fundamental Engineering for the Blunt Body,” in which he applied Walter Vincenti’s framework on engineering epistemology to Harvey Allen’s pioneering work on reentry vehicles.

Bill Warmbrodt, of the Ames Aeromechanics Branch, insisting on reminding all Ames folks of the importance of the NACA to the life of the Center, orchestrated his own events. He arranged a barbecue for aeronautics staff in the parking lot near Cooper Loop, which happened to be named after special guest of honor George Cooper, a legendary NACA test pilot who began his career at Ames in 1945. Bill also festooned the Center with 200 American flags so that everyone knew the day was special as they drove in to work. He put signs on all the Ames buildings built before 1958 so that everyone who worked in those buildings knew that they trod the same paths as the NACA pioneers. Also of note, Bob Windhorst, of the Aviation Systems Division, presented a talk to his colleagues on the founding of the NACA.





3 March 2015: Some folks who worked at Ames during the NACA era (and their tour guides) gathered to mark the 100th anniversary of the day Congress passed legislation establishing the NACA. Left to right: Kristine Clevenger, Hank Cole, Mary Boldt, Leroy Presley, Carolina Rudisel, Richard Kurkowski, George Cooper, and Jack Boyd.

### New Blumberg Chair in Astrobiology

Dr. Nathaniel Comfort will be the third Baruch S. Blumberg NASA/Library of Congress Chair in Astrobiology, starting on 1 October 2015. The program encourages research, discussion, and reflection on the questions surrounding life beyond Earth. The position resulted from an interagency agreement between the NASA Astrobiology Program at Ames and the Library of Congress, which honors the late Dr. Baruch S. Blumberg, Nobel Prize winner and founding director of the NASA Astrobiology Institute.

While at the Library, Comfort will use the collections to examine the history of the genomic revolution in research on the origin of life. Comfort's research addresses one of the central areas of inquiry in the field of astrobiology, which, in addition to the search for life elsewhere in the universe, is focused on how life began and evolved here on Earth.

### ARMSTRONG FLIGHT RESEARCH CENTER (AFRC)

Edwards Air Force Base, California

By Christian Gelzer

I continue to work on outstanding manuscripts, most recently with former Rockwell engineers (courtesy of Dennis Jenkins) who are rummaging through their collection of reports looking for items related to tests conducted on a Shuttle wing and elevon in 1979. An elevon (elev[ator] + [ailer]on) is a control surface on an airplane that combines the functions of an elevator (for pitch control) and an aileron (for roll control). The reports will be used in connection to the "Flight Loads Laboratory" book.

I presented a paper entitled "The NACA's High Speed Flight Research Station and the Development of Reaction Control Systems" at the NACA Centenary Symposium, held at the Smithsonian's Air and Space





Museum, 3–4 March 2015, at which a number of other Center historians also presented. The paper outlines the work by several engineers at the High Speed Flight Research Station to develop a Reaction Control System (RCS) for the X-15, work begun with a Goodyear Electronic Differential Analyzer four years before the rocket plane flew. They moved to a fixed-base simulator and then to the Bell X-1B before it was grounded and they had to settle on an F-104 that they then modified for research purposes. This became the basis for all subsequent RCSes.

I coauthored an article with Albion Bowers, Oscar Murillo, Brian Eslinger, and Robert “Red” Jensen entitled “Spanload Implications for the Flight of Birds,” which has been accepted for publication in the *Public Library Of Science* (PLOS). The article discusses research conducted at Armstrong using two subscale, pure flying wings with a bell spanload rather than an elliptical spanload. The new spanload is based in part on Ludwig Prandtl’s 1932 paper that revised his well-known 1920 “lifting line” paper, and in part on Reimar Horten’s research from the 1930s and ’40s, culminating in a four-page note from 1950 in which he speculates about a spanload solution but offers no substantiation. The current flight research demonstrates proverse yaw (positive thrust) at the wingtips instead of adverse yaw. Equally interesting is this spanload’s relevance to the bird research community. For nearly 85 years, avian researchers have relied on the elliptical spanload to explain bird flight. Improved instrumentation and tools in the past two decades have produced for bird researchers “data not only demonstrating that the elliptical spanload does not fit as an explanation for things such as observed vortex formation and bird formation flight, but their



Shown is Prandtl-D, the second airframe, launched by a large bungee cord and flown by radio control.

research provides evidence in support of the bell spanload as the solution.” The model that does fit—in fact, the only one that explains why birds sometimes fly with overlapping wingtips, why birds do not have vertical tails, or why birds with narrow wingtips don’t suffer tip stalls—is the bell spanload.

Finally, the office plans to have a summer intern, who will complete the research and rewriting of the “Controlled Impact Demonstration” manuscript. This will enable my office to finally usher the manuscript through the steps to publication.



## GLENN RESEARCH CENTER (GRC)

Cleveland, Ohio

By Anne Mills

Glenn Research Center is celebrating its NACA origins this year as part of the NACA Centennial, and we will continue the celebration in January 2016 as we mark our 75th anniversary. Most recently, we launched our GRC History iPad app. The app features over 300 historical photographs—many previously unpublished—and a detailed narrative that accompanies each image. The app is available for the iPad only (iOS 7.0 or higher) in the app store online at <https://itunes.apple.com/us/app/nasa-glenn-research-center/id562903295?mt=8>. If you don't have an iPad, the content and most of the same functionality can be viewed online at <http://www.grc.nasa.gov/WWW/portal/gallery/>.

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**LATER IN THE YEAR, WE ARE PLANNING AN NACA RETIREE REUNION AND A POTENTIAL GRC ALUMNI HALL OF FAME.**

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Additionally, a number of special presentations highlighting our NACA history are being given around the Center and at special events. Later in the year, we are planning an NACA retiree reunion and a potential GRC Alumni Hall of Fame. Currently in the works is a new Web site with detailed information on the NACA Inspections. (Check out the fourth quarter 2014 issue of *News & Notes* for a detailed article on the NACA Inspections, available online at <http://history.nasa.gov/nltr31-4.pdf>.) Inspection materials from the archives at Langley, Ames, and Glenn have been digitized and will be made available to researchers and historians who wish to gain a better understanding of and appreciation for the early work done by these Centers.

## JET PROPULSION LABORATORY (JPL)

Pasadena, California

By Erik Conway

My latest book, *Exploration and Engineering: The Jet Propulsion Laboratory and the Quest for Mars*, has been published by Johns Hopkins University Press. I did a book talk related to it at the La Cañada Flintridge Bookstore in March and a podcast called *The Space Show* on 13 April. I have one more scheduled event for it, at Vroman's Bookstore in Pasadena, in July. The book's cover is the first one I've ever designed (I had meant it as a suggestion of style to my publisher, not a mandate, but they used it!), so I'm particularly proud of it. I hope it gives the book an appropriate flavor of modern engineering.

We've largely completed episode 6 in our ongoing documentary series on the history of JPL. This episode covers retired General Lew Allen, Jr.'s years as director, 1982–90, and completes the account of the Voyager Uranus and Neptune flybys. It also addresses the impact of the Space Shuttle on planetary science during that timespan, primarily through the lens of the Galileo mission.

I've recently started writing my long-intended short history of the Surveyor program of the 1960s. The program was managed by JPL but conducted as a systems contract with Hughes Aircraft Company. Surveyor successfully landed robotic explorers on the Moon five times out of seven attempts, demonstrating the solidity of the lunar surface. Surveyor's story has many twists and turns, with grand plans being diminished in the face of technological and financial changes and a wide range of planned variants being conceived and discarded. Early on, the Surveyor program even included an orbiter before staffing limitations at JPL caused NASA Headquarters to send the orbiter concept to Langley Research Center (which flew it very successfully as Lunar Orbiter). As this is intended to be a short history, I hope to have the manuscript completed next year.



The 50th anniversary of spacecraft-based exploration of Mars is 14 July 2015. JPL's Mariner 4 had its closest approach to Mars on that day in 1965, and it slowly transmitted back 21 "close up" pictures revealing an unexpectedly heavily cratered surface. This date—14 July 2015—also happens to be the date of the Applied Physics Laboratory's New Horizons first reconnaissance of Pluto, so the date will be especially significant.

## MARSHALL SPACE FLIGHT CENTER (MSFC)

Huntsville, Alabama

By Michael Wright

The Marshall History Office has recently completed the digitization of over 5,000 35-millimeter photographic negatives and glass slides housed in the archive. The subjects of these images cover a variety of topics from Mercury to the Space Shuttle Program, with a large number covering the Skylab and Apollo programs. Of particular note was the discovery of a number of negatives of work conducted in the original 8-foot neutral buoyancy tank at Marshall in 1965. This tank was a prototype of two larger tanks that were constructed at Marshall and was utilized in the development of the Skylab Orbital Workshop. The original negatives and slides have been arranged and indexed, while the digital images have been organized with added descriptive metadata. A set of images will soon be made available on the Marshall History Office Web site as we make the move to digitize and place as many of our unique images online as possible. In addition, we plan to select a set of history-related images from the more than 400,000 photographic negatives and digital images in Marshall's photograph library. These negatives date back to 1957 and include many unique photos and artists' concepts connected to all Marshall-related programs, projects, and interesting visits, such as one by Lady Bird Johnson and Walt Disney.

## STENNIS SPACE CENTER (SSC)

Stennis Space Center, Mississippi

By Daphne Alford

An RS-25 rocket engine, formerly the Space Shuttle main engine and now the engine that will drive America's next great rocket to deep space, blazed through its first successful test on 9 January at NASA's John C. Stennis Space Center.

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**AN RS-25 ROCKET ENGINE,  
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STENNIS SPACE CENTER.**

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The RS-25 was fired for 500 seconds on the A-1 Test Stand at Stennis, providing NASA engineers with critical data on the engine controller unit and inlet pressure conditions. This is the first hotfire of an RS-25 engine since the end of Space Shuttle main engine testing in 2009. Four RS-25 engines will power the core stage of NASA's Space Launch System (SLS) on future missions, including to an asteroid and to Mars.

“We've made modifications to the RS-25 to meet SLS specifications and will analyze and test a variety of conditions during the hotfire series,” said Steve Wofford, manager of the SLS Liquid Engines Office at Marshall Space Flight Center, where the SLS Program is managed. “The engines for SLS will encounter colder liquid oxygen temperatures than Shuttle; greater inlet pressure due to the taller core stage liquid oxygen tank and higher vehicle acceleration; and more





The RS-25 engine that will drive NASA's new rocket, the Space Launch System, to deep space blazes through its first successful test on 9 January at Stennis Space Center.

facility in support of RS-25 engine testing.”

Testing will resume after upgrades are completed on the high-pressure industrial water system, which provides cool water for the test facility during a hotfire test. Eight tests, totaling 3,500 seconds, are planned for the current development engine. Another development engine later will undergo 10 tests, totaling 4,500 seconds. The second test series includes the first test of new flight controllers, known as green running.

nozzle heating due to the four-engine configuration and their position in-plane with the SLS booster exhaust nozzles.”

The engine controller unit, the “brain” of the engine, allows communication between the vehicle and the engine, relaying commands to the engine and transmitting data back to the vehicle. The controller also provides closed-loop management of the engine by regulating the thrust and fuel mixture ratio while monitoring the engine’s health and status. The new controller will use updated hardware and software configured to operate within the new SLS avionics architecture.

“This first hotfire test of the RS-25 engine represents a significant effort on behalf of Stennis Space Center’s A-1 test team,” said Ronald Rigney, RS-25 project manager at Stennis. “Our technicians and engineers have been working diligently to design, modify, and activate an extremely complex and capable

The first flight test of the SLS will feature a configuration for a 70-metric-ton

(77-ton) lift capacity and will carry an uncrewed Orion spacecraft beyond low-Earth orbit to test the performance of the integrated system. As the SLS is upgraded, it will provide an unprecedented lift capability of 130 metric tons (143 tons) to enable missions even farther into our solar system.



A close-up view shows the RS-25 engine during its recent hotfire test at Stennis.



## NACA PROCLAMATIONS—CALIFORNIA, OHIO, AND VIRGINIA

**O**n 3 March 2015, the American Institute of Aeronautics and Astronautics hosted a reception for the National Advisory Committee for Aeronautics (NACA) 100th Anniversary Celebration in Washington, DC. The Center Directors at the former NACA Centers read proclamations from their state legislatures for this event. The text for the California, Ohio, and Virginia proclamations has been reprinted below.

### CALIFORNIA LEGISLATURE ASSEMBLY RESOLUTION

By the Honorable Richard S. Gordon, 24th Assembly District, and the Honorable Tom Lackey, 36th Assembly District, Relative to commending the

#### National Advisory Committee for Aeronautics

**Whereas**, Aviation, though born elsewhere, quickly flourished in the State of California, so that the history of the State and of air flight and space exploration are intertwined; and

**Whereas**, On March 3, 1915, the United States Congress established the National Advisory Committee for Aeronautics, or the NACA, to supervise and direct the scientific study of the problems of flight, with a view to their practical solutions, thereby launching the leadership of the U.S. in aerospace research and engineering; and

**Whereas**, In 1939, at Moffett Field in California, the NACA established the Ames Aeronautical Laboratory, known today as the NASA Ames Research Center, and named it after Joseph S. Ames, the long-serving Chair of the NACA and the architect of aeronautical science; and

**Whereas**, Engineers at Ames built the world's greatest collection of wind tunnels and flight simulation facilities, and through their ingenuity and careful experimentation they refined American aircraft for World War II and later advanced many technologies—including the swept wing, the blunt body, lifting bodies, and computational aerodynamics—which proved key to rotorcraft and vertical flight, subsonic commercial airliners, supersonic fighters, and hypersonic spacecraft; and

**Whereas**, Throughout its history, NACA leaders worked in genuine partnership with California's thriving aviation industry, the military services, academic institutions, and state and other federal agencies in a collaborative spirit now reflected in the work culture of Silicon Valley; and

**Whereas**, In 1946, at Muroc Air Force Base, the NACA established a facility known as the NACA High-Speed Flight Research Station, known today as the NASA Neil A. Armstrong Flight Research Center at Edwards Air Force Base, to conduct flight research and validate the technologies of high-speed flight, including the Collier Trophy-winning supersonic X-1 and hypersonic X-15 rocket planes; and

**Whereas**, In 1958, the U.S. Congress established the National Aeronautics and Space Administration (NASA) upon the firm organizational foundation of the NACA, and thus, America entered the Space Age using the science and engineering pioneered by the NACA; and

**Whereas**, Just as the NACA did from 1915 to 1958, and NASA has done from 1958 to the present, the agency's workforce will continue to drive advances in science, technology, aeronautics, and space exploration to enhance the knowledge, education, innovation, economic vitality, and stewardship of Earth for the benefit of all humankind, now, therefore, be it



**Resolved** by Assembly Members Richard S. Gordon and Tom Lackey, That they recognize March 3, 2015, as the centenary of the National Advisory Committee for Aeronautics, and commend the National Aeronautics and Space Administration for furthering the legacy of its predecessor in advancing aerospace engineering and stimulating public interest in aerospace exploration.

*Members Resolution No. 485;  
Dated this 3rd day of March, 2015.*

STATE OF OHIO  
EXECUTIVE DEPARTMENT  
OFFICE OF THE GOVERNOR  
COLUMBUS

**Resolution**

**WHEREAS**, Ohio is the birthplace of aviation and home of Orville and Wilbur Wright, who made the world's first controlled, powered and sustained heavier-than-air human flight, on December 17, 1903 and;

**WHEREAS**, Congress formed the National Advisory Committee for Aeronautics, or the NACA, on March 3, 1915 to "supervise and direct the scientific study of the problems of flight, with a view to their practical solutions," thereby beginning the United States' worldwide leadership in aeronautics research and development and;

**WHEREAS**, the NACA leadership adopted a new and more ambitious mission to promote military and civilian aviation through applied research that looked beyond existing needs, used the most advanced testing facilities in aeronautics research, and performed research activities for commercial and military clients and;

**WHEREAS**, systematic research by the NACA made fundamental contributions to the worldwide

development of aeronautics prior to World War II, including the NACA duct, the NACA cowling, and several series of NACA airfoils, which are still used in aircraft manufacturing and;

**WHEREAS**, in 1941, the NACA chose Cleveland, Ohio as the location of the Aircraft Engine Research Laboratory, now NASA's John H. Glenn Research Center, to further air-breathing propulsion and icing safety research, critical contributions that led to allied victory in World War II; the development of jet engine technologies and soon thereafter, advanced technologies to further the Space Age and;

**WHEREAS**, just as the NACA did from 1915 to 1958, and NASA has done from 1958 to now; the agency's workforce finds solutions to challenges facing the aerospace community; partners with academic institutions focused on science, technology, engineering and math to further knowledge of aeronautics, space and the world around us, and helps the nation reach new heights by revealing the unknown for the benefit of humankind, and;

**NOW, THEREFORE, We, John R. Kasich and Mary Taylor, Governor and Lieutenant Governor of the State of Ohio**, do hereby recognize March 3, 2015 as:

**The Centenary of the National Advisory Committee for Aeronautics**

throughout Ohio and encourage all Ohioans to participate in its observance.

On this 1st day of March, 2015;

*John R. Kasich  
Governor*

*Mary Taylor  
Lieutenant Governor*



## COMMENDING THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Agreed to by the House of Delegates, January 23, 2015

Agreed to by the Senate, February 19, 2015

**WHEREAS**, the National Advisory Committee for Aeronautics was founded on March 3, 1915, “to supervise and direct the scientific study of the problems of flight, with a view to their practical solution,” and

**WHEREAS**, the National Advisory Committee for Aeronautics established the first civilian aeronautics laboratory, Langley Memorial Aeronautical Laboratory (LMAL), in Hampton in 1917; the lab developed unique wind tunnels, facilities, and flight test techniques to advance scientific knowledge of flight; and

**WHEREAS**, the contributions of the LMAL staff were recognized by five prestigious Collier Trophies for engine cowlings to reduce drag, efficient wing de-icing, wind tunnel research on the X-1 aircraft that broke the sound barrier, slotted-throat wind tunnel design for more accurate results at high speeds, and the Whitcomb Area Rule for transonic aircraft design; and

**WHEREAS**, the LMAL performed numerous wind tunnel tests on pre-production and post-production aircraft to reduce drag, thus improving the performance of nearly every American World War II aircraft; and

**WHEREAS**, the LMAL was instrumental in the founding of additional National Advisory Committee for Aeronautics research laboratories that are now known as Wallops Flight Facility in Virginia, Ames Research Center and Armstrong Flight Research Center in California, and Glenn Research Center in Ohio, which became the core centers for the National Aeronautics and Space Administration (NASA); and

**WHEREAS**, the LMAL significantly advanced understanding of transonic, supersonic and hypersonic flight through research by the Pilotless Aircraft Research Division and participation in the X-1 and X-15 research aircraft programs; from these programs, the Space Task Group was formed, which developed the Mercury, Gemini, and Apollo programs that put Americans in space and on the moon and went on to found Johnson Space Center in Texas; and

**WHEREAS**, on October 1, 1958, the National Advisory Committee for Aeronautics was dissolved, and all personnel and programs were transferred to the National Aeronautics and Space Administration, which carried on the committee’s mission; and

**WHEREAS**, the LMAL became the NASA Langley Research Center on October 1, 1958 and continues to build on the research of the National Advisory Committee for Aeronautics to solve the challenges that exist in our nation’s air transportation system—congestion, safety, and environmental impacts—and to help develop technologies for on-demand air transportation, where goods and people can be delivered anytime, anywhere; and

**WHEREAS**, NASA Langley is working to make supersonic passenger travel possible and to safely integrate unmanned aerial systems into the national airspace; recognizing the importance of commercial space initiatives, NASA Langley is working with companies to advance their technology and manufacturing capabilities; and

**WHEREAS**, NASA Langley led the development of the Mars Viking mission and successfully landed the first two robotic landers on the surface of Mars, contributed to the development and operation of the Space Shuttle, and continues its critical spaceflight research with contributions to the nation’s next human space transportation system development, including the Orion spacecraft and the Space Launch System; and



**WHEREAS**, NASA Langley made vital advancements through satellite-based observations that measure the Earth's atmosphere in order to understand how human activities may affect the environment, and it developed remote sensing systems that continue to pave the way for new atmospheric discoveries that help protect the Earth and its people with earlier and better-informed public policy decisions; now therefore, be it

**RESOLVED** by the House of Delegates, the Senate concurring, That the General Assembly hereby commend the National Aeronautics and Space Administration for its work to enable the United States' leadership in aeronautics and space on the occasion of the 100th anniversary of the establishment of the National Advisory Committee for Aeronautics; and, be it

**RESOLVED FURTHER**, That the Clerk of the House of Delegates prepare a copy of this resolution for the presentation to the National Aeronautics and Space Administration as an expression of the General Assembly's admiration for the legacy of the National Advisory Committee for Aeronautics and best wishes for continued success in the exploration and development of space, aeronautics, and earth sciences.

*House Patrons: Helsel and Yancey*  
*Senate Patron: Locke*

*Signed by G. Paul Nardo*  
*Clerk of the House of Delegates*

## OTHER AEROSPACE HISTORY NEWS

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### NATIONAL AIR AND SPACE MUSEUM (NASM)

By Michael Neufeld

To commemorate the 50th anniversary of the first spacewalks in 1965, NASM debuted a new six-month exhibition, "Outside the Spacecraft: 50 Years of Extravehicular Activity," to be on display between 8 January and 8 June 2015. It presents art, photography, artifacts, and personal accounts that relate the continuing story of extravehicular activities (EVAs), or spacewalking.

In March, NASM installed the "Dynamic Sun Video Wall" at the base of Skylab in Space Hall. This dazzling display presents near-real-time imagery of the Sun from the Atmospheric Imaging Assembly (AIA) instrument aboard the Solar Dynamics Observatory satellite. The AIA instrument was designed and built, and is operated, by the Smithsonian Astrophysical Observatory and Lockheed Martin; solar data are

automatically updated overnight. David DeVorkin (Space History) was actively involved in making this exhibit possible.

In January, NASM staff lowered the Spirit of St. Louis from its hanging place to the floor below for conservation work. SpaceShipOne followed in March, and the Bell X-1 Glamorous Glennis in April. Conservation work will be conducted in sight of visitors for the next several months in preparation for rehangings of the aircraft for display in the renovated Boeing Milestones of Flight Hall.

*Pluto's Secret: An Icy World's Tale of Discovery*, written by Margaret Weitekamp and David DeVorkin (both Space History) and illustrated by Diane Kidd (Education), won the 2015 Children's Literature Award from the American Institute of Aeronautics and Astronautics (AIAA). The medal was presented to Weitekamp at the SciTech 2015 meeting in Kissimmee, Florida, in January.





James David (Space History) has published a new book, *Spies and Shuttles: NASA's Secret Relationships with the DoD and CIA* (University Press of Florida, 2015). This book is a real-life spy saga, and the author uses many newly declassified documents to reveal how NASA

became a strange bedfellow of the Department of Defense (DOD) and the Central Intelligence Agency (CIA). Beginning with the establishment of NASA in 1958, David follows the Agency through its growth, not only in scope but also in complexity, exposing the ties between spaceflight and the intelligence community. He shows NASA's early cooperation—supplying cover stories for covert missions, analyzing the Soviet space program, providing weather and other scientific data from its satellites, and monitoring missile tests—and reveals how these extensive interactions eventually devolved into NASA's reliance on DOD for political and financial support for the Shuttle. In connection with this book, the National Security Archive has posted an Electronic Briefing Book by David entitled “NASA's Secret Relationships with the DoD and CIA” available online at <http://nsarchive.gwu.edu/NSAEBB/NSAEBB509/>.

Smithsonian Books published the handsome exhibition volume *Time and Navigation: The Untold Story of Getting from Here to There*, coauthored by Andrew Johnston (Center for Earth and Planetary Studies), Roger Connor (Aeronautics), Paul Ceruzzi (Space History), and Carlene Stephens (National Museum of American History). The online exhibition is available at <http://timeandnavigation.si.edu/>.

Several Space History staff members published articles: Hunter Hollins, “The War Bond Poster: State

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**TO COMMEMORATE THE 50TH ANNIVERSARY OF THE FIRST SPACEWALKS IN 1965, NASM DEBUTED A NEW SIX-MONTH EXHIBITION, ‘OUTSIDE THE SPACECRAFT: 50 YEARS OF EXTRAVEHICULAR ACTIVITY,’ TO BE ON DISPLAY BETWEEN 8 JANUARY AND 8 JUNE 2015.**

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Fundraising and National Cohesion Through Mass Media During the World Wars,” *Federal History Journal* no. 7 (January 2015): 35–52; Thomas C. Lassman, “Putting the Military Back into the History of the Military-Industrial Complex: The Management of Technological Innovation in the U.S. Army, 1945–1960,” *Isis* 106 (March 2015): 94–120; and Margaret A. Weitekamp “‘We’re Physicists’: Gender, Genre and the Image of Scientists in *The Big Bang Theory*,” *Journal of Popular Television* 3, no. 1 (1 April 2015): 75–92(18). Several Space History curators contributed short pieces to the exhibition catalog *Tools: Extending Our Reach*, edited by Cara McCarty and Matilda McQuaid (New York: Smithsonian Cooper Hewitt Design Museum, 2014).

Two Space History curators presented papers at the 56th Annual Meeting of the International Studies Association in New Orleans on 18 February: Paul E. Ceruzzi’s title was “The Global Positioning System: Military Origins, Civilian Applications, and the Culture of Precise Positioning,” and Martin Collins’s topic was “The Corporation Ascendant: Iridium’s Global Satellite Telephone System and the Post-Cold War World.” Collins more recently lectured to academic groups in Berlin, Helsinki, and Stockholm.

Roger Connor (Aeronautics) lectured on Capitol Hill to the House Entertainment Caucus about the history of drones in the film industry on 25 February.



The first two of four lectures in the Exploring Space Lecture Series featured Frank Cepollina of NASA Goddard Space Flight Center on 26 February and Michael Massimino of Columbia University on 26 March, both speaking on aspects of servicing the Hubble Space Telescope. As an astronaut on the STS-125 mission, Massimino took part in several spacewalks during the final Hubble servicing mission. The theme of this year's series is "Hubble: 25 Years and Counting." Two other lectures are scheduled in June.

NASM partnered with NASA to host a scholarly symposium, "The NACA Centenary: A Symposium on 100 Years of Aerospace Research and Development," on 3–4 March 2015, in the museum's "Moving Beyond Earth" exhibition. More than 25 papers were presented, and more than 100 historians, engineers, scientists, and others attended.

#### Sir Arthur C. Clarke Collection

NASM has acquired from the Arthur C. Clarke Trust 87 cubic feet of material that will be made available soon to researchers at the Steven F. Udvar-Hazy Center. The collection contains correspondence, audio- and videotapes, 16-millimeter films, and early drafts of the screenplay for *2001: A Space Odyssey*. Read more details and see images of several items from the collection online at <http://blog.nasm.si.edu/highlights-from-the-collection/clarkes-personal-papers/>.

### AMERICAN ASTRONAUTICAL SOCIETY (AAS) HISTORY COMMITTEE

By Michael Ciancone, AAS  
History Committee Chair

As a result of the persistence and diligence of series editor Dr. Rick Sturdevant, and with the efforts of volume editors Oti Liepack and Niklas Reinke and copy editor Joni Wilson, Univelt has published the 2011

and 2012 proceedings in the International Academy of Astronautics History Series.

Ron Miller and Joni Wilson prepared an illustrated booklet to commemorate the 30th anniversary of the Emme Award for Astronautical Literature. Electronic copies of this booklet are available online at <http://www.astronautical.org/awards/emme>.

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**THE AAS HISTORY COMMITTEE  
IS PLEASED TO ANNOUNCE  
THE ESTABLISHMENT OF  
THE ORDWAY AWARD FOR  
SUSTAINED EXCELLENCE IN  
SPACEFLIGHT HISTORY.**  
”

The AAS History Committee is pleased to announce the establishment of the Ordway Award for Sustained Excellence in Spaceflight History. This award is named in memory of Frederick I. Ordway III (1927–2014), human spaceflight advocate and chronicler of the history of rocketry and space travel. The award is presented on an occasional basis by the American Astronautical Society and recognizes exceptional, sustained efforts to inform and educate on astronautical history through one or more media, such as (1) writing, editing, or publishing a book series (as opposed to a single title); (2) preparing and presenting exhibits; or (3) producing material for distribution through film, television, art, or other nonprint media. The award process is managed by the AAS History Committee. Nomination forms are available online at <http://www.astronautical.org/awards/ordway>.



## RECENT PUBLICATIONS AND ONLINE RESOURCES

Compiled by Chris Gamble

### NEW SERIES IN NASA HISTORY (PUBLISHED BY JOHNS HOPKINS UNIVERSITY PRESS)

*Exploration and Engineering: The Jet Propulsion Laboratory and the Quest for Mars*, by Erik M. Conway (Johns Hopkins University Press, January 2015). The Jet Propulsion Laboratory (JPL) in Pasadena, California, has become synonymous with the United States' planetary exploration during the past half century. This work focuses on JPL's missions beginning in the 1990s and continuing through the Mars Phoenix mission of 2007. During this time, the Center led the way in engineering an impressive, rapidly evolving succession of Mars orbiters and landers, including roving robotic vehicles whose successful deployment onto the Martian surface posed some of the most complicated technical problems in spaceflight history. In this book, the author reveals how the creative technological feats of JPL engineers led to major Mars exploration breakthroughs. Conway takes readers into the heart of the Lab's problem-solving approach and management structure, where talented scientists grappled with technical challenges while also coping with such bureaucratic challenges as funding shortfalls.

### COMMERCIALY PUBLISHED WORKS

*After Apollo? Richard Nixon and the American Space Program*, by John M. Logsdon (Palgrave Macmillan, March 2015). On 20 July 1969, Neil Armstrong took "one small step for a man, one giant leap for mankind." The success of the Apollo 11 mission satisfied the goal that had been set by President John F. Kennedy just over eight years earlier. It also raised the question "What do you do next after landing on the Moon?" It fell to President Richard M. Nixon to answer this question. *After Apollo? Richard Nixon and the American*

*Space Program* traces, in detail, how Nixon and his associates went about developing their response.

*Archaeology and Heritage of the Human Movement into Space*, edited by Beth Laura O'Leary and P. J. Capelotti (Springer, September 2014). This volume addresses the creation, documentation, preservation, and study of the archaeology of lunar, planetary, and interstellar exploration. It defines the attributes of common human technological expressions within national and, increasingly, private exploration efforts, and it explores the archaeology of both fixed and mobile artifacts in the solar system and the wider galaxy. The book provides the emerging archaeological perspective on the history of human exploration of space. Humans have been creating a vast archaeological preserve in space and on other celestial bodies; this assemblage of heritage objects and sites attests to the human presence away from Earth. As space exploration has reached the half-century mark, it is an appropriate time to reflect on the major events and technological development of this particular arena of human history.

*The Art of Space*, by Ron Miller (Zenith Press, October 2014). This comprehensive celebration of space art profiles the development of space-based art in a variety of media. In this book, the author presents over 350 high-quality and often photorealistic images that chart how artists throughout history, working with the knowledge and research available during their time, have endeavored to construct realistic images of visions throughout the universe. Beginning with depictions of spaceships, robotic probes, and space stations, Miller moves through collections that also illustrate the planets, moons, galaxies, and stars; cities, colonies, and space habitats; and possible alien life. The artwork presented here has been created in a variety of media, from the woodcuts and oil paintings of the Victorian and Edwardian eras to the digitally enhanced work of contemporary artists.



*Atlas of Great Comets*, by Ronald Stoyan (Cambridge University Press, March 2015). Throughout the ages, comets, enigmatic and beautiful wandering objects that appear for weeks or months, have alternately fascinated and terrified humankind. The result of five years of research, this book is a generously illustrated reference on 30 of the greatest comets that have been witnessed and documented since the Middle Ages. Special attention is given to the cultural and scientific impact of each appearance, supported by a wealth of images, from woodcuts, engravings, historical paintings, and artifacts to a showcase of the best astronomical photos and images.

*Beyond: Our Future in Space*, by Chris Impey (W. W. Norton & Company, April 2015). Human exploration has been an unceasing engine of technological progress, from the first *Homo sapiens* to leave our African cradle to a future in which humankind promises to settle another world. *Beyond* tells the epic story of humanity leaving home—and how humans will soon thrive in the vast universe beyond Earth. Combining expert knowledge of astronomy and avant-garde technology, the author guides us through the heady possibilities for the next century of exploration.

*Bigelow Aerospace and Expandable Modules—Colonizing Space One Piece at a Time*, by Erik Seedhouse (Springer, November 2014). At the core of Bigelow's plan is inflatable-module technology. Tougher and more durable than their rigid counterparts, these inflatable modules are perfectly suited for use in space, where Bigelow plans to link them together to form commercial space stations. This book describes how this new breed of space stations will be built and how the link between NASA and private companies such as Bigelow Aerospace can lead to a new economy—a space economy. Finally, the book touches on Bigelow's aspirations beyond low-Earth orbit, plans that include the landing of a base on the lunar surface and the prospect of missions to Mars.

*Building Earth Observation Cameras*, by George Joseph (CRC Press, January 2015). The book discusses the science and technology of building an electro-optical

imaging system for a space platform from concept to space qualification and in-orbit evaluation. It provides a broad overview of various Earth-imaging systems with specific examples illustrating the design and development issues that impacted the Indian Remote Sensing Satellite (IRS) cameras, and it is based on the actual experience of the author, who was intimately involved with the development of cameras for the IRS program.

*Canadian Spacewalkers: Hadfield, MacLean and Williams Remember the Ultimate High Adventure*, by Bob McDonald (Douglas & McIntyre, March 2015). Spacewalking is a physically exhausting, mentally rigorous endeavor. But what is it really like to step into that abyss, to leap out into space with only the thin fabric of your suit between you and the universe? In *Canadian Spacewalkers*, author Bob McDonald compiles the spacewalkers' perspectives and presents a transcription of an extensive interview with astronauts who tell tales of training underwater in the world's largest swimming pool, recount how they learned to use power tools in microgravity while wearing bulky gloves, and describe the moment when they opened the hatch and stepped outside.

*The Cassini-Huygens Visit to Saturn: An Historic Mission to the Ringed Planet*, by Michael Meltzer (Springer-Praxis, January 8, 2015). Cassini-Huygens was the most ambitious and successful space journey ever launched to the outer solar system. This book examines all aspects of the journey: its conception and planning, the lengthy political processes needed to make it a reality, the engineering and development required to build the spacecraft, its 2.2-billion-mile journey from Earth to Saturn, and the amazing discoveries from the mission.

*Civil Earth Observations: National Strategy and Plan*, edited by Brendon Walters (Nova Science Publishers, Inc., November 2014). The U.S. government is the largest provider of environmental and Earth-system data in the world. Voluminous amounts of information come from a complex array of satellites, ocean buoys, stream gauges, human surveys, and other



platforms for collecting what the scientific community calls Earth observations. These data are used every day to protect life and property and answer key questions about our planet. This book establishes a framework for increasing the efficiency and effectiveness of the nation's Earth observation enterprise. The National Plan for Civil Earth Observations aims to maximize the value of observations collected by federal agencies of Earth's land surfaces, oceans, and atmosphere.

*Deep Space: Beyond the Solar System to the End of the Universe and the Beginning of Time*, by Govert Schilling (Black Dog & Leventhal Publishers, November 2014). Schilling explores what lies beyond the threshold of our solar system on this mind-bending trip to visit red dwarfs, hot Jupiters, and starburst galaxies, along with gazing over the edge of the visible universe into the so-called "dark flow." After a brief and condensed review of the solar system at the beginning of the book—including an explanation of the Sun, planets, and small bodies such as asteroids and comets—*Deep Space* carries on from the threshold of our galaxy through the Milky Way to the outer edges of the universe and beyond. The reader will learn about the birth of new stars in our own galaxy (from molecular clouds to protoplanetary disks), other planets beyond our own solar system (lava worlds, water worlds, and even Earth-like places), and other galaxies beyond the Milky Way (starburst galaxies, lenticular galaxies, and elliptical galaxies). The book concludes with a discussion of cosmic evolution, the remaining mysteries concerning dark matter and dark energy, life in the universe, and the speculative idea of a "multiverse" consisting of numerous parallel universes.

*Developing National Power in Space: A Theoretical Model*, by Brent Ziarnick (McFarland & Company, February 2015). Exploring the nature of space programs and how nations can maximize advantages gained from space operations, this book draws from military and economic theory to describe an original model of the development and employment of a nation's ability to operate in space. Chapters discuss the implications for the history and organization of America's space program, particularly its military dimension. The rise

of American naval power at the beginning of the 20th century is investigated as a historical analog to the current American situation in space, and a method is proposed for the United States to lead the next chapter of the Space Age.

*Edgar Martins: The Rehearsal of Space and the Poetic Impossibility To Manage the Infinite*, text by Sérgio Mah, João Seixas, and John Gribbin; photographs by Edgar Martins (La Fábrica; bilingual Spanish-English edition, October 2014). Though a notoriously secretive organization, in 2012, the European Space Agency (ESA) allowed Portuguese photographer Edgar Martins (born 1977) to explore their facilities. The photographs collected here depict more than 15 ESA facilities—test centers, robotics departments, jet propulsion laboratories, space simulators, astronaut training centers, and more—scattered throughout the world. Though Martins's photographs aim for total reproductive fidelity, their very simplicity and starkness disassembles space, provoking contemplation of the aesthetic, material, and discursive potentialities of these highly confidential areas.

*European Autonomy in Space*, edited by Cenan Al-Ekabi (Springer, January 2015). This volume provides analyses and evaluations of the continuing importance of Europe's autonomy in its access to space as a key driver in the development of European space capabilities. From a detailed historical analysis of some of the pitfalls of dependence in the space industry, experts analyze the full range of current European space capabilities and identify areas where autonomy is both possible and required, even in a situation of severe budgetary constraints. The contributions present a comprehensive overview of European efforts in a broad range of areas, including energy, culture, science, and security; access to space, space applications, human spaceflight, security, and space situational awareness; and strategic issues.

*Extraterrestrial Intelligence and Human Imagination: SETI at the Intersection of Science, Religion and Culture*, by John Traphagan (Springer, November 2014). The search for extraterrestrial intelligence (SETI)



represents one of the most significant crossroads at which the assumptions and methods of scientific inquiry come into direct contact with—and in many cases conflict with—those of religion. Indeed, at the core of SETI is the same question that motivates many interested in religion: What is the place of humanity in the universe? Scientists involved with SETI (and in other areas) and individuals interested in and dedicated to some religious traditions are engaged in contemplating these types of questions, even if their respective approaches and answers differ significantly.

*Extreme: Why Some People Thrive at the Limits*, by Emma Barrett and Paul Martin (Oxford University Press, November 2014). Why do some people risk their lives regularly by placing themselves in extreme and challenging situations? For some, such as astronauts, the extreme environments are part of the job. Others are motivated by the thrill and competition of extreme sports, or the achievement of goals such as being the first to arrive at a remote, difficult-to-reach location under extreme conditions. Whether for sport or employment, all these people have made the personal choice to put themselves in environments in which there is significant risk. What drives such people? And what skills and personality traits enable the best to succeed? What abilities are shared by the successful mountaineer, astronaut, caver, or long-distance solo sailor? And are there lessons the rest of us can learn from them?

*Food in the Air and Space: The Surprising History of Food and Drink in the Skies*, by Richard Foss (Rowman & Littlefield Publishers, December 2014). This book is the first to chart the history of food worldwide, exploring the intricacies of in-flight dining from 1783 to the present day aboard balloons, zeppelins, land-based aircraft, flying boats, and spacecraft. It charts the ways in which commercial travelers were lured to try flying with the promise of familiar foods; explains the problems of each aerial environment and the ways in which chefs, engineers, and flightcrews adapted to them; and tells the stories of pioneers in the field.

*Gemini 3: The NASA Mission Reports*, by Steve Whitfield (Apogee Prime, December 2014). Virgil “Gus” Grissom and John Young flew the first crewed Gemini mission, which was an important step toward America’s moving ahead in the space race. The Gemini spacecraft was the new upgraded “Advanced” two-person vehicle that would allow its crew to live in space comfortably for several days at a time. The flight of Gemini 3—launched atop an Air Force Titan missile—was a high-risk moment in the early days of space exploration. In this book, details of this important first flight are collected, along with many diagrams and illustrations.

*Handbook of Space Security: Policies, Applications and Programs*, edited by K.-U. Schrogl, P. L. Hays, J. Robinson, D. Moura, and C. Giannopapa (Springer-Verlag, October 2014). Space security involves the use of space (in particular, communication, navigation, Earth observation, and electronic intelligence satellites) for military and security purposes on Earth and also the maintenance of space (in particular the Earth orbits) as a safe and secure area for conducting peaceful activities. The two aspects can be summarized as “space for security on Earth” and “the safeguarding of space for peaceful endeavors.” In providing a global and coherent analytical approach to space security today, the *Handbook* focuses on four areas that together define the entire space security area: policies, technologies, applications, and programs.

*History of Rocketry and Astronautics*, vol. 42, edited by Otfried G. Liepack, American Astronautical Society (AAS) History Series, vol. 42, International Academy of Astronautics (IAA) History Symposia, vol. 31 (AAS/Univelt, Inc., December 2014). This volume contains the proceedings of the 45th History Symposium of the International Academy of Astronautics held in Cape Town, South Africa, in 2011.

*History of Rocketry and Astronautics*, vol. 43, edited by Niklas Reinke, AAS History Series, vol. 43, IAA History Symposia, vol. 32 (AAS/Univelt, Inc., April



2015). This volume contains the proceedings of the 46th History Symposium of the International Academy of Astronautics held in Naples, Italy, in 2012.

*How Outer Space Made America: Geography, Organization and the Cosmic Sublime*, by Daniel Sage (Ashgate Publishing Co.; new edition, November 2014). In this book, the author analyzes how and why American space exploration reproduced and transformed American cultural and political imaginations by appealing to a desire for, and to an extent organizing, the transcendence of spatial and temporal frontiers. While largely engaging with the historical development of space exploration, it shows how contemporary cultural and social, and indeed geographical, research themes, including national identity, critical geopolitics, gender, technocracy, trauma, and memory, can be informed by the study of space exploration.

*Infinite Worlds: The People and Places of Space Exploration*, by Michael Soluri (Simon & Schuster, November 2014). This stunning collection of photographs and essays goes behind the scenes at NASA and introduces us to the astronauts, technicians, administrators, and ground crew that saved the Hubble Space Telescope. This book is an unscripted photographic documentary inside the world of three NASA Centers in Maryland, Texas, and Florida. This is the first book of its kind since the end of the Space Shuttle Program. With more than 300 full-color photographs and 15 essays, it will appeal not only to the space history buff but also to the armchair traveler, as well as families wanting an insightful and beautiful keepsake of the Space Shuttle era.

*Infrared Astronomy—Seeing the Heat: From William Herschel to the Herschel Space Observatory*, by David L. Clements (CRC Press, November 2014). Infrared astronomy has revolutionized our understanding of the universe and has become essential to studying cosmology. Accessible to amateur astronomers, this book presents an overview of the science and technology associated with infrared astronomy. With color figures,

it shows how infrared astronomy provides insights into the workings of the universe that are unavailable at other wavelengths.

*The Interstellar Age: Inside the Forty-Year Voyager Mission*, by Jim Bell (Dutton, February 2015). The Voyager spacecraft are our farthest-flung emissaries—11.3 billion miles away from the team that built and still operates them decades after their launch. Voyager 1 left the solar system in 2013; its sister craft, Voyager 2, will do so in 2015. The fantastic journey began in 1977, before the first episode of *Cosmos* aired. The mission was planned as a grand tour beyond the Moon; beyond Mars, Jupiter, and Saturn; and maybe even into interstellar space. The fact that it actually happened makes this humanity's greatest space mission. In this book, award-winning planetary scientist Jim Bell reveals what drove and continues to drive the members of this extraordinary team, including Ed Stone, Voyager's chief scientist and the one-time head of NASA's Jet Propulsion Laboratory; Charley Kohlhase, an orbital dynamics engineer who helped to design many of the critical slingshot maneuvers around planets that enabled the Voyagers to travel so far; and Larry Soderblom, one of the geologists whose Earth-bound experience would prove to be of little help in interpreting the strange new landscapes revealed in the Voyagers' astoundingly clear images of moons and planets.

*Mars Rover Curiosity: An Inside Account from Curiosity's Chief Engineer*, by Rob Manning and William L. Simon (Smithsonian Books, October 2014). This book gives a firsthand account of the trials and tribulations of engineering one of the most complex pieces of space technology, the Mars Rover Curiosity, by its chief engineer, Rob Manning. In this book, Manning tells of bringing the groundbreaking spacecraft to life. Manning and his team at JPL, tasked with designing a lander many times larger and more complex than any before, faced technical setbacks; fights over inadequate resources; and the challenges of leading an army of brilliant, passionate, and often frustrated experts.



*The Meaning of Liberty Beyond Earth*, edited by Charles S. Cockell (Springer, September 2014). The purpose of this book is to initiate a new discussion on liberty focusing on the infinite realms of space. The discussion of the nature of liberty and what it means for a human to be free has occupied the minds of thinkers since the Enlightenment. However, without exception, every one of these discussions has focused on the character of liberty on Earth. The emergence of human space exploration programs in the last 50 years raises a fundamental and new question: what will be the future of liberty in space? In this book, new questions will be addressed, such as these: Can a person be free when the oxygen he breathes is the result of a manufacturing process controlled by someone else? Will the interdependence required to survive in the extremities of the extraterrestrial environment destroy individualism? What are the obligations of the individual to the extraterrestrial state? How can we talk of extraterrestrial liberty when everyone is dependent on survival systems?

*Michael Najjar: Outer Space*, by Michael Najjar (Distanz; bilingual German-English edition, November 2014). In the near future, Najjar, one of Germany's most renowned photographers, will head for outer space in SpaceShipTwo, a spacecraft currently under development. His eyes firmly set on his goal, the artist has utterly dedicated himself to his series on outer space, which is based on photographs and video pieces. He began work on his current series by undergoing the intense training future astronauts receive in Russia's Star City. Defying physical limitations, Najjar pushed his body to extremes in stratospheric and zero-g flights, in addition to centrifuge and spacewalk training sessions, recording what happened to him with the camera in order to probe his own perceptions. The cultural dimension of cutting-edge space technology, as well as its implications for future insights into the universe, space travel, and repercussions for our society, are central issues in his work. The book offers insights into Najjar's preparations for his spaceflight and presents the first cycle of works from the outer space series. This work includes essays by Buzz Aldrin, Anousheh Ansari, Andreas Beutin, Pierre Cox, Lord

Norman Foster, Michael López-Alegría, and Sir Tim Smit, as well as a conversation between Camilla Péus and Michael Najjar.

*NASA Gemini 1965–1966 (All Missions, All Models): An Insight into NASA's Gemini Spacecraft, the Precursor to Apollo and the Key to the Moon (Owners' Workshop Manual)*, by David Woods and David M. Harland (Haynes Publishing, January 2015). The Gemini spacecraft was an agile flying machine for fighter pilots; it gave the United States the tool it needed to fly into space and in doing so prepared NASA to travel to the Moon. In a breathless series of 10 crewed flights spread across only 20 months between 1965 and 1966, Gemini transformed NASA from a tentative, inexperienced space agency into a tough, competent, and confident organization that could send astronauts to another world. This book celebrates this important spacecraft with a thorough look at the technologies and techniques that were developed for the program during its heyday.

*NASA Security and Export Control: Analyses and Perspectives*, edited by Abraham Quinn (Nova Science Publishers, Inc., October 2014). Weaknesses in NASA's export control policy and implementation of foreign-national access procedures at some Centers increase the risk of unauthorized access to export-controlled technologies. NASA policies provide Center Directors with the ability to implement export controls at their Centers. This book assesses NASA's export control policies and the ways in which Centers implement them, along with the extent to which NASA Headquarters and Center Export Administrators apply oversight of Center compliance with the Agency's export control policies.

*National Space Law in China: An Overview of the Current Situation and Outlook for the Future*, by Yun Zhao (Martinus Nijhoff, January 2015). China has made rapid developments in space technologies and space activities in the last few years; however, it still lags behind in the legal arena. In order to provide guidelines for and promote further development of space activities, China should speed up its national





space legislation process. Zhao offers a comprehensive study of national space laws, regulations, and policies in China. This book contains rich information and materials on China's space law and practice. As the first English monograph on national legislation on space law in China, this book will contribute to the understanding of China's current legal regime for space activities and future national space legislation.

*The New Moon: Water, Exploration, and Future Habitation*, by Arlin Crotts (Cambridge University Press, September 2014). This book explores Earth's closest neighbor, the Moon. What startling discoveries are being uncovered on the Moon? What will these tell us about our place in the universe? How can exploring the Moon benefit development on Earth? This book also discusses the role of the Moon in Earth's past and present, as well as the lunar environment and how it could be made more habitable for humans. The book also asks if continued exploration of the Moon is justified and offers rare Apollo-era photos and film stills. This is a complete story of the human lunar experience, presenting many interesting but little-known and significant events in lunar science for the first time.

*New Space Frontiers: Venturing Into Earth Orbit and Beyond*, by Piers Bizony (Zenith Press, October 2014). It is easy to imagine that the Space Shuttle's retirement has edged the Space Age toward closure, at least in terms of human flight beyond the bounds of Earth. However, there are now more spacecraft being constructed to carry humans than at any time since Yuri Gagarin became the first man in space half a century ago. What's more, NASA is no longer the only big player in the space game. Commercial, nongovernmental space exploration is becoming a reality rather than just a pipe dream. What orbital adventures await us in the next five decades? Will humans ever again head as far into space as the Apollo astronauts once did? NASA's new hardware is aimed toward asteroid missions and ultimately Mars, but there is a significant chance that a government-funded space agency will not be the only—or even the first—organization to send humans across the solar system. Through gorgeous photography and engaging writing, noted space

and science author Piers Bizony speculates beyond today's hardware and explores what might be possible for the next generation.

*Nobody Owns the Moon: The Ethics of Space Exploitation*, by Tony Milligan (McFarland & Company, January 2015). This book explores some of the emerging ethical issues of the space frontier and evaluates the prospects for the medium-range future: Can terraforming of other worlds succeed? Would it be defensible? Should there be limits to mining in space? Do lifeless planets have an integrity that ought to be respected? Could indigenous microbacteria have intrinsic value? Do we have a duty to extend human life? Also discussed are the ethics of sending world ships on interstellar journeys and the risks associated with seeding other worlds with rudimentary forms of life. The ethics of space exploration is as much about humanity as it is about space. The book concludes with a study of the connection between a single home planet and a single moral community.

*The Orbital Perspective: Lessons in Seeing the Big Picture from a Journey of 71 Million Miles*, by Ron Garan (Berrett-Koehler Publishers, February 2015). For astronaut Ron Garan, living on the International Space Station (ISS) was a powerful, transformative experience—one that he believes holds the key to solving our problems on Earth. On spacewalks and through windows, Garan was struck by the stunning beauty of Earth from space but sobered by knowing how troubled our planet is. Yet on the ISS, Garan, a former fighter pilot, was working alongside Russians, who, only a few years before, had been “the enemy.” If 15 nations could collaborate on one of the most ambitious, technologically complicated undertakings in history, surely humanity could apply that kind of cooperation and innovation toward creating a better world. That spirit is what Garan calls the “orbital perspective.” Garan vividly conveys what it was like learning to work with a diverse group of people in an environment that only a handful of human beings have ever known. But more importantly, he describes how he and others are working to apply the orbital perspective here at home, embracing new partnerships



and processes to promote peace and combat hunger, thirst, poverty, and environmental destruction. This book is a call to action for each of us to care for the most important space station of all: planet Earth.

*Pathways to Exploration: Rationales and Approaches for a U.S. Program of Human Space Exploration*, by the Committee on Human Spaceflight, Aeronautics and Space Engineering Board, Space Studies Board, Division on Engineering and Physical Sciences, Committee on National Statistics, Division of Behavioral and Social Sciences and Education, and National Research Council (National Academies Press, October 2014). The United States has publicly funded its human spaceflight program on a continuous basis for more than half a century, through three wars and half a dozen recessions—from the early Mercury and Gemini suborbital and Earth orbital missions; to the lunar landings; to the first reusable, winged, crewed space plane that the United States operated for three decades. Today, the United States is the major partner in a massive orbital facility—the International Space Station—that is becoming the focal point for the first tentative steps in commercial cargo and crewed orbital spaceflights. And yet the long-term future of human spaceflight beyond this project is unclear. Pronouncements by multiple Presidents of bold new ventures by Americans to the Moon, to Mars, and to an asteroid in its native orbit have not been matched by the same commitment that accompanied President Kennedy’s now-fabled 1961 speech—namely, the substantial increase in NASA funding needed to make it happen. Are we still committed to advancing human spaceflight? What should a long-term goal be, and what does the United States need to do to achieve it? *Pathways to Exploration* explores the case for advancing this endeavor, drawing on the history of rationales for human spaceflight, examining the attitudes of stakeholders and the public, and carefully assessing the technical and fiscal realities.

*Planetary Exploration and Science: Recent Results and Advances*, edited by Shuanggen Jin, Nader Haghighipour, and Wing-Huen Ip (Springer, November 2014). This

monograph is the first work to present the latest results and findings on the field of planetary exploration and sciences, particularly for Japan’s SELENOlogical and ENgineering Explorer (SELENE); China’s Chang’E-1 and 2; India’s Chandrayaan-1; and the United States’ Lunar Reconnaissance Orbiter, Gravity Recovery and Interior Laboratory, Mars Reconnaissance Orbiter, Mars Express, MESSENGER (MErcury Surface, Space ENvironment, GEochemistry, and Ranging), and other missions.

*Planet Mercury—From Pale Pink Dot to Dynamic World*, by David A. Rothery (Springer, November 2014). A new and detailed picture of Mercury is emerging thanks to NASA’s MESSENGER mission, which spent four years in orbit about the Sun’s innermost planet. This work is comprehensively illustrated by close-up images. The author describes Mercury’s landscapes from a geological perspective: from sublimation hollows, to volcanic vents, to lava plains, to giant thrust faults. He considers what its giant core, internal structure, and weird composition have to tell us about the formation and evolution of a planet so close to the Sun. This is of special significance in view of the discovery of so many exoplanets in similarly close orbits about their stars.

*Regulation of Commercial Space Transport—The Astrocizing of ICAO*, by Ruwantissa Abeyratne (Springer, November 2014). This book provides a look at the various nuances of the commercial aspects of space transport and offers a workable and practical legal and regulatory approach to be taken by the International Civil Aviation Organization (ICAO). The book also addresses the perceived lack of wisdom in neglecting to consider the basic legal structure of a regulatory regime for commercial space transport as a first step and goes on to analyze ways and means of using the existing legal instruments pertaining to international civil aviation as an analogous system that can be molded into a separate and cohesive set of multilateral legal instruments that could apply to commercial space transport.



*Remove Before Flight*, by Scott Phillips (Tate Publishing, December 2014). As a 10-year-old boy inspired by fellow Ohioan Neil Armstrong when he landed on the Moon in 1969, the author dreamed of someday becoming part of something larger than himself. Ten years later, through a series of serendipitous life events, Scott Phillips embarked on a career with NASA's groundbreaking Space Shuttle Program. He was the last team member to exit the first External Tank prior to its maiden flight on 12 April 1981, and he saved the "Remove Before Flight" ribbon as a memento. What followed was an extraordinary 33-year adventure encompassing the entire span of the program—from the depths of tragedy to the heights of scientific triumphs—documented by exclusive, never-before-seen photos and firsthand stories. This book takes the reader on a historical and personal journey that will enlighten and entertain.

*The Road to Modern Rocketry: Launch Bases, Centers, Museums, Memorials, and Monuments*, by Doug Gangler (Champion Books, LLC, December 2014). In this book, the author brings to life the fast-moving yet intensive history of the modern rocket. Featured are 41 rocket and space "attractions" spread over the five countries—Germany, France, the United Kingdom, Russia, and the United States—in which the story of the modern rocket occurred. The present-day launch bases, test/engineering centers, museums, World War II-era planned launch bunkers, memorials, rocket/space theme parks, and monuments are an almost unique set of sites telling the incredible, inspirational story of the modern rocket.

*Rockets and Revolution: A Cultural History of Early Spaceflight*, by Michael G. Smith (University of Nebraska Press, 2014). This book offers a multifaceted study of the race toward space in the first half of the 20th century, examining how Russian, European, and American pioneers competed against one another in the early years to acquire the fundamentals of rocket science, engineer simple rockets, and ultimately prepare the path for human spaceflight.

*Rocket Manual, 1942 Onwards: An Insight into the Development and Technology of Space Rockets and Satellite Launchers*, by David Baker (Haynes Publishing, January 2015). This book tells the story of rocket motors: how they were first developed, how they work, how they are used, and how they are operated. This manual explains and describes not only the engines themselves, but also the rockets that carry payloads into space, to the Moon, and to the planets.

*The Scientific Exploration of Venus*, by Fredric W. Taylor (Cambridge University Press, September 2014). Venus is the brightest "star" in the night sky, and it has been observed since ancient times. Often dubbed Earth's "twin," it is the planet most similar to Earth in size, mass, and composition. There the similarity ends: Venus is shrouded by a dense carbon dioxide atmosphere, its surface is dominated by thousands of volcanoes, and it lacks a protective magnetic field to shield it from energetic solar particles. So why isn't Venus more like Earth? In this book, a leading researcher of Venus addresses this question by explaining what we know through our investigations of the planet. Venus presents an intriguing case study for planetary astronomers and atmospheric scientists, especially in light of the current challenges of global warming.

*Space Architecture: The New Frontier for Design Research*, edited by Neil Leach (Wiley, January 2015). Forty years since the first Moon landing, space architecture is entering a new era. Over the last decade, there has been a fundamental shift in the space industry from short-term pioneering expeditions to long-term planning for colonization, as well as new ventures such as space tourism. Architects are now involved in designing the interiors of long-term habitable structures in space; researching advanced robotic fabrication technologies for building structures on the Moon and Mars; envisioning new "space yachts" for the super-rich; and building new facilities, such as the Virgin Galactic Spaceport America in New Mexico designed by Foster + Partners. Meanwhile, the mystique of space remains as alluring as ever, as high-profile designers and educators—such as Greg



Lynn—are running design studios drawing upon ever-more-inventive computational design techniques. This book features the most significant current projects under way and highlights key areas of research in space, such as energy, materials, manufacturing, and robotics. It also looks at how this research and investment in new technologies might transfer to terrestrial design and construction.

*Space Record Breakers*, by Anne Rooney (Carlton Kids, November 2014). Space is mind-boggling. Time is measured in billions of years, and distances in trillions of miles. This book takes all this wonder and packages it in digestible, factual form, focusing half on the natural wonders of space and half on the history (and future) of humankind's exploration.

*Space Systems for Disaster Warning, Response and Recovery*, by Scott Madry (Springer, October 2014). This book provides a general overview of the role of satellite applications for disaster mitigation, warning, planning, recovery, and response. It covers the overall role and perspective of emergency management professionals as well as the space applications that support their work. Key insights are provided as to how satellite telecommunications, remote sensing, navigation systems, geographic information systems, and the emerging domain of social media are utilized in the context of emergency management needs and requirements. These systems are now critical in addressing major humanmade and natural disasters.

*Spies and Shuttles: NASA's Secret Relationships with the DoD and CIA*, by James E. David (University Press of Florida, January 2015). In this book, the author reveals the extensive and largely hidden interactions between NASA and United States Department of Defense (DOD) and Central Intelligence Agency (CIA). The story begins with the establishment of NASA in 1958 and follows the Agency through its growth, not only in scope but also in complexity. In *Spies and Shuttles*, the author digs through newly declassified documents to ultimately reveal how NASA became a strange bed-fellow to DOD and the CIA.

*Starmus: 50 Years of Man in Space*, with contributions from Garik Israelian, Brian May, and David J. Eicher (Carlton Books, Ltd., October 2014). *Starmus* is a series of talks, articles, and recollections that celebrate the human exploration of space. The book is the result of the Starmus meeting in 2011, where legendary Russian and American pioneers of the Space Age met for the first time to share the moments that electrified the human race. An all-star cast of international celebrities joined forces in this book to discuss and celebrate humanity's first half century in space.

*Survival and Sacrifice in Mars Exploration—What We Know from Polar Expeditions*, by Erik Seedhouse (Springer Praxis, April 2015). The experience gained in polar exploration more than 100 years ago provides crews and mission planners with a framework to deal with contingencies, and it is this framework that forms the core of this book. Why the parallels between polar and space exploration? Because polar exploration offers a better analogy for a Mars mission today than those invoked by the space community. Although astronauts are routinely compared to Lewis and Clark, Mars-bound astronauts will be closer in their roles to polar explorers. And, as much as space has been described as a new frontier, Mars bears a greater similarity to the polar regions, which is why so much can be learned from those who venture there.

*The Twenty-first Century in Space*, by Ben Evans (Springer-Praxis, December 2014). Picking up where *Partnership in Space* left off, the story commemorating the evolution of human space exploration unfolds in further detail. *Twenty-first Century in Space*, the sixth book in the History of the Human Space Exploration series, explores how the fledgling partnership between the United States and Russia in the 1990s gradually bore fruit and laid the groundwork for today's International Space Station. The narrative follows the convergence of the Shuttle and Mir programs, together with stand-alone missions (including servicing the Hubble Space Telescope), many of which provided technical and human lessons that enabled the first efforts to build the ISS in orbit. The book also looks to the future of developments in the 21st century.



*Vandenberg Air Force Base*, by Joseph T. Page II (Arcadia Publishing, December 2014). Stretching over 45 miles of pristine California coastline and covering over 99,000 acres, Vandenberg Air Force Base has been the vanguard for the United States' space and missile program. The site of over 1,900 launches since 1957, Vandenberg put the world's first photoreconnaissance (spy) satellite into orbit and is the only launch location for America's operational intercontinental ballistic missile force. Within these pages are stories and photographs that highlight Vandenberg Air Force Base's legacy as the free world's first missile base.

*Virgin Galactic: The First Ten Years*, by Erik Seedhouse (Springer-Praxis, April 2015). Today, Richard Branson flies airlines on six continents; employs hundreds of jets; and, in 2014, was predicting that his spaceship company—Virgin Galactic—would soon open the space frontier to commercial astronauts, payload specialists, scientists, and space tourists. With more than 600 seats sold at \$250,000 each, what started off as a dream to send people just for the excitement, to look back and marvel at Earth, was on the cusp of finally being turned into a business. Then, on 21 October 2014, tragedy struck with the disintegration of SpaceShipTwo. Soon after the event, Branson vowed to continue his space tourism venture. Already, a second SpaceShipTwo is being built, and ticket holders eagerly await the day when Virgin Galactic will offer quick, routine, and affordable access to the edge of space. This book explains the hurdles Virgin Galactic has had and still has to overcome en route to developing suborbital space travel as a profitable economic entity, and it describes the missions that will be flown on board SpaceShipTwo Mk II, including high-altitude science studies as well as astronomy, life sciences, and microgravity physics experiments.

*Voices of the Soviet Space Program: Cosmonauts, Soldiers, and Engineers Who Took the USSR into Space*, by Slava Gerovitch (Palgrave Macmillan, December 2014). Despite the wealth of information and archival material that have become available in the years following the fall of the Soviet Union, the history of the Soviet space program has been dominated by the accounts

of a select few, such as the recent four-volume English translation of Russian rocket designer Boris Chertok. In this remarkable oral history, author and interviewer Slava Gerovitch helps to enrich and complicate space historiography by presenting interviews with the men and women who witnessed Soviet space efforts firsthand: from the cosmonauts themselves, to the military officials who directed the program, to the engineers who made real their country's grand ambitions.

*Yearbook on Space Policy 2012/2013: Space in a Changing World*, edited by Cenani Al-Ekabi, Blandina Baranes, Peter Hulsroj, and Arne Lahcen (Springer, February 2015). The *Yearbook on Space Policy* is the reference publication analyzing space policy developments. Each year, it presents issues and trends in space policy and the space sector as a whole. Its scope is global, and its perspective is European. The *Yearbook* also links space policy with other policy areas. It highlights specific events and issues and provides useful insights and information on space activities. The book was edited by members of the European Space Policy Institute, based in Vienna, Austria.

*You Are Here: Around the World in 92 Minutes—Photographs from the International Space Station*, by Chris Hadfield (Little, Brown and Company, October 2014). Organized by continent, this book represents one (idealized) orbit of the International Space Station. This planetary photo tour is also punctuated with fun, fascinating commentary on life in microgravity. In the spirit of his bestselling *An Astronaut's Guide to Life on Earth*, Hadfield opens a singular window on our planet, using remarkable photographs to illuminate the history and consequences of human settlement, the magnificence (and wit) of never-before-noticed landscapes, and the power of the natural forces shaping our world and the future of our species.

*The History Program Office wishes to thank 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

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The joint meeting of the Council of State Archivists and the National Association of Government Archives and Records Administrators will be held **22–25 July 2015** in Austin, Texas. Visit <http://www.statearchivists.org> for more details.

The annual meeting of the Society of American Archivists will be held **16–22 August 2015** in Cleveland, Ohio. Visit <http://www2.archivists.org/conference> for more details.

The annual meeting of the Society for the History of Technology will be held **8–11 October 2015** in Albuquerque, New Mexico. Visit <http://www.historyoftechnology.org/> for more details.

The 66th International Astronautical Congress will be held **12–16 October 2015** in Jerusalem, Israel. Visit <http://www.iac2015.org/> for details.

The annual meeting of the Oral History Association will be held **14–18 October 2015** in Tampa, Florida. Visit <http://www.oralhistory.org/annual-meeting/> for details.

The annual meeting of the Society for Social Studies of Science will be held **11–14 November 2015** in Denver, Colorado. Visit <http://www.4sonline.org/meeting> for details.

The annual meeting of the History of Science Society will be held **19–22 November 2015** in San Francisco, California. Visit <http://hssonline.org/meetings/2015-hss-annual-meeting/> for more details.

The 48th Fall Meeting of the American Geophysical Union will be held **14–18 December 2015** in San Francisco, California. Visit <http://fallmeeting.agu.org/2015/> for details.

## OBITUARY

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### PHILIP EDGAR CULBERTSON

Sadly, Philip Edgar Culbertson passed away on 4 April 2015. Culbertson's long and illustrious career in the aerospace industry began after he received his bachelor's degree in aeronautical engineering from the Georgia Institute of Technology (Georgia Tech) after World War II ended. Culbertson worked on missile guidance systems as a commissioned officer in the Navy. When he left military service, he attended the University of Michigan, where he obtained a master's degree in aeronautical engineering and worked on wind tunnel testing as a research associate. Culbertson spent 11 years working at General Dynamics/



In this image from 27 July 1982, Culbertson speaks before an audience at the first workshop on space debris at the Gilruth Center.

Convair in engineering and technical management, overseeing the conversion of the Atlas missile into a booster for the Mercury program and for a deep space launch vehicle through the use of the Agena and Centaur upper stages. In 1965, Culbertson began his career at NASA, serving in management positions for human spaceflight, including Skylab, the Apollo-Soyuz Test Project, and the International Space Station. During his 23-year career at the Agency, he served as the Associate Deputy Administrator (1981–84), Associate Administrator for Space Station (1984–85), and Associate Administrator for Policy and Planning (1987–88). Although he retired in 1988, he remained active in the aerospace industry through consulting.



## IMAGE IN NASA HISTORY

On 7 May 1945, the National Advisory Committee for Aeronautics (NACA) established the Pilotless Aircraft Research Station on Wallops Island, Virginia, under the Langley Aeronautical Research Laboratory for aeronautical research and also missile research during World War II. On 27 June 1945, Wallops launched its first test rocket (see image); then it launched the first research rocket (a Tiamat) on 4 July. In 1958, the Pilotless Aircraft Research Station became Wallops Station under the new National Aeronautics and Space Administration (NASA). Wallops Station expanded into the field of human spaceflight research and tested the Mercury space capsule design. In the 1970s, Wallops was renamed Wallops Flight Center. In 1981, Wallops finally received the name that we know today—Wallops Flight Facility, under Goddard Space Flight Center.



### NASA HEADQUARTERS HISTORY PROGRAM OFFICE STAFF CONTACT INFORMATION:

<b>William Barry</b> Chief Historian	<i>bill.barry@nasa.gov</i> 202-358-0383
<b>Nadine Andreassen</b> Program Support Specialist	<i>nadine.j.andreassen@nasa.gov</i> 202-358-0087
<b>Colin Fries</b> Archivist	<i>cfries@mail.hq.nasa.gov</i> 202-358-0388
<b>Stephen Garber</b> Historian	<i>stephen.j.garber@nasa.gov</i> 202-358-0385
<b>Jane Odom</b> Chief Archivist	<i>jane.h.odom@nasa.gov</i> 202-358-0386

<b>Yvette Smith</b> Editor	<i>yvette.smith-1@nasa.gov</i> 202-358-5196
<b>Elizabeth Suckow</b> Archivist	<i>elizabeth.suckow-1@nasa.gov</i> 202-358-0375
<b>Warren Dennis</b> Intern	<i>warren.j.dennis@nasa.gov</i> 202-358-0680
<b>Melissa Joskow</b> Intern	<i>melissa.c.joskow@nasa.gov</i> 202-358-2577



**CREATED AND PRODUCED BY:**

Giny Cheong, Newsletter Editor  
Lisa Jirousek, Editor  
Michele Ostovar, Graphic Designer  
Tun Hla, Printing Specialist  
Trenita Williams, Mail Coordinator  
Carl Paul, Distribution

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National Aeronautics and Space Administration

**NASA Headquarters**  
300 E Street SW  
Washington, DC 20546  
[www.nasa.gov](http://www.nasa.gov)