

NEWS & NOTES

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First and Second Quarter 2018

FROM THE CHIEF HISTORIAN



This edition of NASA History's *News & Notes* may be late, but it is full of good news. My apologies to you for the late delivery, but we had a bit of a perfect storm of personnel shortages early this year that left us extremely short-handed in January and February. We're beginning to catch up now—and that is largely thanks to the superb efforts of the team here in the History Division, as well as the addition of a few new members of the team. As mentioned in our last issue, after doing a fantastic job for us last fall, Will Thompson headed off to Virginia Tech for graduate school at the start of this year. Due to a contract transition, we wound up without a replacement for that important position until the end of February. If you are wondering who could possibly replace Will and live up to the standard set by Andres Almeida before him, I'm happy to let you know that the answer is... Andres Almeida. After some time away energizing the Smithsonian Transcription Center, Andres has returned home to NASA, and we are thrilled to have him back. Also, early in the year, due to college schedules, we were operating with just one intern. We now (as of the start of April) are up to a full complement of two interns. (You can read more about our interns in the "News from Headquarters and the Centers" section inside.)

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WELCOME, ROBYN RODGERS— NASA'S NEW CHIEF ARCHIVIST

By Bill Barry

Robyn Rodgers comes to the NASA History Division after seven years at the National Archives and Records Administration (NARA) in a variety of posts. Most recently, she has been working at NARA College Park, Maryland, as a supervisory archivist in the processing unit and in records management, focusing on Army and Department of Defense records. She began as an archivist at the U.S. Army Women's Museum in 2007. There, she worked collaboratively with collections and educational staff, providing primary sources for static and changing exhibits and public programming, as well as working with a variety of researchers. She left the museum for the NARA Anchorage office in 2011, where her favorite records came from Record Group 75, U.S. Reindeer Service, and Record Group 200, Sir Henry S. Wellcome Collection. Shortly after Robyn arrived there, the director of the office retired and Robyn took up responsibility for program operations as well as archival duties. In 2013, she was drafted by the head of the National Archives at San Bruno, California, to help in the response to a problematic Inspector General report. As a senior archivist at San Bruno, she planned and oversaw the box-level inventory of more than 85,000 cubic feet of records.

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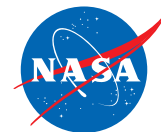
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NASA HISTORY DIVISION
OFFICE OF COMMUNICATIONS



National Aeronautics and
Space Administration



From the Chief Historian (continued)

The other great news is that we had a stunning group of applicants for the position of Chief Archivist. We've made a selection. Our feature article in this issue introduces our new Chief Archivist. Our archival program is the foundation of our history efforts, and we have gone far too long without a Chief Archivist—almost two years since the retirement of Jane Odom in 2016.

Great things are happening at our Center history programs as well. Jet Propulsion Laboratory historian Erik Conway (you may remember his article on Explorer 1 from the last edition of *News & Notes*) was named a Guggenheim Fellow in April. The Guggenheim is an extremely prestigious fellowship awarded each spring by the John Simon Guggenheim Memorial Foundation to recognize individuals who have demonstrated exceptional capacity for productive scholarship or exceptional creative ability in the arts. Of 3,000 candidates, 173 people were named fellows in several categories on 4 April. Erik was recognized in the humanities category for his work on the history of science, technology, and economics. Congratulations, Erik!

It may not be as prestigious, but each spring, the NASA History Program recognizes the person involved in NASA history or archival work who has made the most significant contributions in the previous calendar year. Nominations can come from any source (except for self-nomination), and most of them come from those of us involved in the program. The History team at Headquarters makes the selection (we are not eligible to win, by the way), so this is really a peer recognition award, and the selection is never easy. This year, Brian Odom, the historian at Marshall Space Flight Center, was the honoree. Brian's nomination noted his outstanding work in 2017 in a number of spheres. Foremost among these were his outstanding efforts in organizing the "NASA in the 'Long' Civil Rights Movement Symposium" in Huntsville, 16–17 March 2017. This was a well-organized event on a subject of great public interest and relevance. In addition to the symposium itself, Brian has led efforts to publish a collection of papers from the event. Brian immediately followed up on this initiative by commencing work on a followup symposium (scheduled for 2019) titled "NASA in the South." For most people, doing

their regular work while taking on the organization of a symposium and a book based on it would fill an incredibly busy and productive year. But Brian was also finishing work on his doctoral degree at the same time. Congratulations, Dr. Brian!

Another item to chalk up in the good news category this spring was the conference "To Boldly Preserve: Archiving for the Next Half-Century of Spaceflight." This event, hosted at the American Institute of Physics in College Park, Maryland, on 1–2 March, was a phenomenal gathering of a wide array of scholars, practitioners, journalists, and others interested in the challenges of collecting the historical evidence of spaceflight, now and in the future. My deepest thanks to Jonathan Coopersmith, Angel Callahan, and Greg Good for their outstanding organization of the conference (and their steady nerve in the face of weather that closed the rest of the government). I'd also like to note the support for the conference provided by the National Science Foundation, as well as the sponsorship for the event by Explore Mars. As noted at the conference, the gathering was just the first step in what will be a long and continuing process, but what an important and well-executed step it was. I urge you to take a look at the conference Web site (<http://toboldlypreserve.spacepublic/index.php>) and engage in the followup activities. We'll be sure to keep you up to date on opportunities in future editions of *News & Notes*.

Finally, I'll note that we are deep in preparation for the NASA 60th anniversary (1 October 2018) and the Apollo mission 50th anniversaries (starting this October and running through December 2022). There are a lot of great creative ideas already in the works. Do you have a great idea for these anniversaries? It is never too late to drop us a note or give us a call. We'd love to hear from you.

In the meantime, Godspeed,



William P. Barry
Chief Historian

Welcome, Robyn Rodgers—NASA's New Chief Archivist (continued)



Pictured is Robyn Rodgers, NASA's new Chief Archivist.

Robyn has a bachelor's degree in American history from Virginia State University and holds a master's degree in library and information sciences from San Jose State University. Recent professional publications include contributions to the e-book *100 Years of Fort George G.*

Meade (available at <http://www.ftmeade.army.mil/staff/pao/100Years.html>), as well as storyboarding and editing an article on the Office of Scientific Research and Development entitled "Secret Weapons, Forgotten Sacrifices: Scientific R&D in World War II." She is currently working on a piece documenting the leadership challenges of World War I-era Australian Army Nursing Service matrons. Her personal interests range from quilting and canning to biking and yoga, and she has a self-professed "embarrassing" affection for "terrible historical dramas." She has two grown daughters and a blended herd of pets.

HAPPY 60TH BIRTHDAY, NASA

By Bill Barry and Beth Dickey

In 2018, NASA will mark the 60th anniversary of its establishment as a U.S. Government agency. President Dwight D. Eisenhower signed NASA's founding legislation, the National Aeronautics and Space Act, on 29 July 1958. NASA considers its birthday to be 1 October, the day the Agency opened for business. We will be marking this milestone throughout the first 10 months of 2018 with a number of events, online features, and social media outreach. Those in the Washington, DC, area may have visited the John F. Kennedy Center for the Performing Arts from late May through early June. In conjunction with a pair of National Symphony Orchestra Pops concerts held on 1 and 2 June, NASA supported a 60th anniversary exhibit in the Hall of Nations at the Kennedy Center. Across the country, NASA Centers will also be featuring the anniversary in a variety of activities over the summer and through the actual anniversary date at the start of October. Immediately after the NASA 60th anniversary celebrations, we will turn our attention to the 50th anniversary of the

Apollo missions to the Moon. (Expect more information on this in future issues of *News & Notes*.)

NASA has released an official logo for use in observing the 60th anniversary. Created by NASA graphic artist Matthew Skeins, the logo depicts how NASA is building on its historic past to soar toward a challenging and inspiring future. Take a look on the following page:



CREATED BY NASA GRAPHIC ARTIST MATTHEW SKEINS, THE LOGO DEPICTS HOW NASA IS BUILDING ON ITS HISTORIC PAST TO SOAR TOWARD A CHALLENGING AND INSPIRING FUTURE.





Shown above is NASA's 60th anniversary logo.

“NASA” and “60” are stacked, bold and tall, atop the continental United States, the curvature of Earth, and the light of an approaching dawn. This placement captures the spirit of a metaphor about knowledge and discovery, often attributed to 17th-century physicist Isaac Newton: “If I have seen further than others, it is by standing on the shoulders of giants.” Similarly, NASA was built from the legacy and expertise of giants in government-sponsored research and development, including the National Advisory Committee for Aeronautics (NACA), the Naval Research Laboratory, the Army Ballistic Missile Agency, and the Jet Propulsion Laboratory.

The United States is shown at night beneath a sparkling web of yellow lights. This imagery symbolizes NASA’s vibrancy and relevance, the inspiration derived from NASA’s work, and the solid foundation of the “best and brightest” among industry and academia upon which the Agency’s leadership in space is built. The light-blue-and-white arc just below the alphanumeric elements recalls the sunrise, seen 16 times each day aboard an Earth-orbiting spacecraft, and symbolizes opportunity yet to come through exploration of the Moon, Mars, and destinations far beyond.

Two vectors, one blue and one red, circle the alphanumeric elements and point toward the dark outer edges of the logo as if zooming into the unknown. In doing so, they form a “6,” which is emblematic of the number of decades since NASA was established. The blue vector represents NASA’s roots in aeronautics research and the societal impact of our first views of Earth as a solitary “blue marble” in the vast blackness of space. The red vector represents NASA’s leadership of an innovative and sustainable exploration program that engages commercial and international partners; enables the expansion of human presence to the Moon, Mars, and throughout the solar system; and brings new knowledge and opportunities back to Earth. Depicted at the tip of this vector are the key elements of NASA’s new

deep space transportation system, the Space Launch System rocket and Orion crew vehicle.

A crescent moon, a ringed planet, and a field of stars amid a nebula of light blue represent NASA’s scientific underpinnings, particularly the enduring quest for answers to age-old questions about the workings and evolution of our planet, our solar system, and the universe.

For more information about NASA’s 60th anniversary, visit <http://www.nasa.gov/60>.

NEWS FROM HEADQUARTERS AND THE CENTERS

NASA HEADQUARTERS

Washington, DC

History Division

By Bill Barry

Early 2018 has been a wild ride at the NASA Headquarters History Division. For a short while there in January, we were running with about half of the staff we should have on hand. Things improved quickly, as noted in the “From the Chief Historian” article on the front page of this issue of *News & Notes*. With the added load of planning for the major upcoming anniversaries, we are just now starting to get caught up with things that slipped through the cracks. The key to getting caught up (especially on this newsletter) was the return of Andres Almeida in late February as our special project coordinator. He is once again shepherding the newsletter, managing our effort on the annual *Aeronautics and Space Report of the President*, and wrangling our interns. We are thrilled to have him (and even his bad puns) back home here in the NASA History Division.

Speaking of interns, Allison Gasparini, a senior physics major at Syracuse University, really saved us by starting her spring internship with us on 16 January. Despite having to put up with me as her immediate supervisor, Allison quickly figured out what needed to be done and got on with the task at hand. I greatly appreciate her initiative and ability to run with the ball on her own. Sadly for us, her last day with us was on 4 May. But the good news for Allison is that she’ll be heading directly back to New York to graduate a few

days later. Due to the academic calendar at Dartmouth (they are on a quarter system), our other spring intern, Maeve McBride, arrived here on 2 April. The day before she had flown home from a family spring break trip to Europe, so she earned extra points for dealing with the “new-to-NASA” firehose while jet-lagged. Maeve, a sophomore majoring in anthropology, was with us until Friday, 8 June. This provided us with intern coverage through the typically lean month of May. In fact, the first of our summer interns overlapped with Maeve. Kate Wall, currently a sophomore at Saint John’s College in Annapolis, started with us in mid-May. Kate is majoring in liberal arts (basically a “great books” program, which is the only major offered at St. John’s) and will be interning with us until the first week of August. Savannah Jelks, currently a rising junior majoring in history at Union College in Poughkeepsie, New York, started her internship here on 18 June. We expect her to be with us until the third week of August. As usual, we had a big and outstanding group of applicants for the summer internship. I wish we could take more of them.

“**STEVE GARBER AND I, ALONG WITH BRIAN ODOM OF MARSHALL SPACE FLIGHT CENTER, ARE IN DISCUSSIONS WITH OUR COLLEAGUES AT THE NATIONAL AIR AND SPACE MUSEUM ABOUT ORGANIZING A HISTORICAL WORKSHOP ON THE APOLLO PROGRAM.**”

I have similar feelings about our search for our new Chief Archivist. We also had a large and very impressive group of applicants to fill that position. The choice was extremely difficult, but after a long application and evaluation process, we are glad to welcome Robyn Rodgers as our new Chief Archivist. You can learn about her in our feature article.

In addition to the Agency-level work on the various upcoming anniversaries, Steve Garber and I, along with Brian Odom of Marshall Space Flight Center, are

in discussions with our colleagues at the National Air and Space Museum about organizing a historical workshop on the Apollo program. Our current thinking is to pull together a one-day (or one-and-a-half-day) workshop for dialogue about the Apollo era across time, generations, disciplines, and interests. The goal of this is to kickstart further work on the Apollo program by bringing to bear new approaches and ideas from the perspective of 50 years. We hope to inspire young scholars, and those in fields that haven't typically studied the space program, to seek new meaning and understanding. Assuming that we can pull together the funding, the current proposal is to hold this event in the Washington, DC, area early in December this year. We'll be sure to let you know more as plans develop.

AMES RESEARCH CENTER (ARC)

[Moffett Field, California](#)

First Quarter

By Layne Karafantis and April Gage

To celebrate the 78th anniversary of Ames Research Center, on 20 December 2017 Jack Boyd and Center Director Eugene Tu served a cake featuring a photo of the 1939 groundbreaking of Ames Aeronautical Laboratory. The sign outside the Center's front gate invited employees to attend festivities for this event in the Mega Bytes cafeteria. After the holidays, in early January, a planning committee convened for a kickoff meeting to prepare for the 80th anniversary of Ames in 2019. The committee hopes to integrate its efforts and events with those that will celebrate the 50th anniversary of the Apollo program.

New Center historian Layne Karafantis has been busy familiarizing herself with the many exciting areas of research being conducted at Ames. In addition to serving on the 80th anniversary committee, she is also part of a committee planning an event for summer 2018 that will highlight the Center's contributions to air traffic management.

Sixty years ago, 1958 inaugurated not only the Space Age, but the Jet Age. That year, the first U.S. passenger jet—the Boeing 707—went into service, and also during that year, more passengers crossed the Atlantic by air than by sea. Since that time, the skies have become increasingly congested, necessitating modernization efforts in air traffic management (ATM). In 1972, Heinz Erzberger at Ames wrote foundational papers regarding the development of a four-dimensional guidance and navigation system. Erzberger created a set of algorithms that pioneered a breakthrough in the field and whose byproducts are used by the Federal Aviation Administration to control air traffic. Current developments in air traffic management at Ames are directly drawn from the contributions of Erzberger. His work provided the foundation for a suite of decision-support tools, known as the Center-TRACON (Terminal Radar Approach Control Facilities) Automation System (CTAS), which revolutionized air traffic management. Layne is currently preparing a timeline and booklet that recognize ARC's contributions to ATM, which will be distributed at an event held at the Center in August 2018.

Since his hiring by Ames in 1965, and even after his retirement in 2006, Erzberger has contributed to research and development in air traffic management as an Ames associate and senior advisor. He played a significant role in the development of NextGen software that detects and resolves aircraft conflicts. Many of the automation tools developed at ARC are in use at major American airports, and their implementation has resulted in more efficient operations that have significantly reduced travel delays and have produced savings of hundreds of millions of dollars. Erzberger has received numerous awards, including the 2005 Distinguished Presidential Rank Award, and the Center looks forward to hosting a public event that will honor his legacy and draw attention to the cutting-edge research currently being conducted in the Aviation Systems Division.



From left to right: Shown are Tim Tawney, Rick Guidice, and April Gage at Cité de l'Architecture et du Patrimoine Museum in Paris. (Photo credit: Susan Jaekel)



Rick Guidice visits the exhibit with the Bernal sphere concept paintings he created in the 1970s. (Photo credit: April Gage)

In other news, holdings from Ames and Langley Research Centers' History Office archives are on display at the Cité de l'Architecture et du Patrimoine museum in Paris. Ames loaned three paintings depicting Bernal sphere space settlement concepts by artist and architect Rick Guidice, while Langley Research Center provided imagery of the NASA Lunar Orbit and Landing Approach (LOLA) simulator, which was designed during the Apollo program to prepare pilots for landing on the Moon. The exhibit, *Globes: Architecture and Science Map the World*, explores the many ways that architects have worked alongside geographers, astronomers, mathematicians, and artists in depictions of the terrestrial globe and conceptions of the cosmos. On personal travel, senior archivist April Gage attended this exhibition with Rick Guidice and NASA Paris Bureau Chief Tim Tawney, with the museum's lead curator Yann Rocher providing an in-depth guided tour. The exhibit runs through March 2018, after which it may be modified to become a traveling exhibition.

The Center's History Office recently moved into the Ames Public Affairs Office and is now under the direction of Matthew Buffington, while Jack Boyd remains senior advisor.

Second Quarter

Historian Update

by Layne Karafantis

Jack Boyd and the History Office have continued to serve a committee, headed by Deputy Director for Center Operations Michael Tubbs, responsible for planning the celebration of the 80th anniversary of Ames in 2019. Layne Karafantis has progressed in familiarizing herself with Ames and its subject matter experts. She was warmly greeted at a luncheon of the Owl Feather Society, a group of Ames retirees who regularly meet and host presentations. Layne has offered to provide feedback on Ames-related book projects written by its members, such as Ken Mort's promising work on the history of the National Full-Scale Aerodynamics Complex (NFAC). She has reached out to other Bay Area institutions to discuss shared interests, meeting curators from the USS Hornet Museum and the Computer History Museum, as well as faculty at San Jose State University.

At Ames, Layne recently gave a presentation to the Public Affairs Office on the ways that the historian can serve as a resource. She expects to provide a similar talk to Women's Influence Network members at their



A NEW ACQUISITION OF NOTE THIS QUARTER IS A RICH COLLECTION OF PERSONAL PAPERS OF THE LATE DR. DAVID KOCH, DOCUMENTING HIS SIGNIFICANT CONTRIBUTIONS TO GAMMA-RAY, X-RAY, AND INFRARED ASTRONOMY.



next meeting and hopes to assist the organization with its ambitions for a publication on the contributions of women at Ames.

Layne presented at the Historical Society of Southern California annual meeting in Pomona on the topic of conducting aerospace history while in government service. While she was in Southern California, she also was interviewed for the upcoming KCET television series *Blue Sky Metropolis*. This interview was requested partly due to a recent publication that she coauthored with Bill Leslie, “Suburban Warriors: The Blue-Collar and Blue-Sky Communities of Southern California,” for the *Journal of Urban Planning* (2018). She attended the Organization of American Historians meeting in Sacramento, and later this year, she has been asked to present, serve on panels, and chair sessions at the annual meetings of the International Committee for the History of Technology, the Society for the History of Technology, and the History of Science Society.

Archives Update

by April Gage

April and Danielle K. Lopez remain busy supporting both the Ames History Office and Life Sciences Data archives. In the History Office archives, end-of-year metrics showed a 46 percent increase in acquisitions of new material and a 10 percent rise in demand for reference information services from the previous year.

A new acquisition of note this quarter is a rich collection of personal papers of the late Dr. David Koch, documenting his significant contributions to gamma-ray, x-ray, and infrared astronomy. As a student at the University of Wisconsin–Madison in the 1960s, Koch (whose name rhymes with “lock”) worked on scientific instruments in x-ray and gamma-ray astronomy as applied to balloons, sounding rockets, and Saturn boosters. While earning master’s and doctoral degrees in physics at Cornell University, he designed a balloon-borne gamma-ray telescope that detected the first pulsed high-energy gamma rays from the Crab pulsar. Later, with American Science and Engineering in the 1970s, Koch was project scientist for NASA’s Uhuru x-ray satellite, which produced the first all-sky survey, and for the Einstein Observatory (HEAO-B, formerly the High-Energy Astronomy Observatory), which was the precursor to the Chandra X-ray Observatory. At the Harvard-Smithsonian Center for Astrophysics, he was project scientist for the SpaceLab 2 infrared telescope. After joining Ames Research Center in 1988, Koch served as project scientist for the Kuiper Airborne Observatory (KAO) and co-investigator for the Space Infrared Telescope Facility (SIRTF, now known as the Spitzer Space Telescope). He also led mission operations for SIRTF and the Stratospheric Observatory for Infrared Astronomy (SOFIA). In



Former Kepler Mission deputy principal investigator Dr. David Koch (center, in the light-blue shirt) is interviewed by news media in 2006. (Photo credit: NASA)

connection with his work with KAO and SOFIA, he launched and led the Flight Opportunities for Science Teacher EnRichment (FOSTER) project to support science, technology, engineering, and mathematics (STEM) education. Koch's career culminated in his becoming the deputy principal investigator for the Kepler Mission, following his collaboration with Bill Borucki in a decades-long effort to form the Kepler space observatory.

In March, NASA supported a conference entitled "To Boldly Preserve: Archiving for the Next Half-Century of Space Flight" at the American Institute of Physics in College Park, Maryland, where April joined colleagues from Headquarters, Goddard Space Flight



Former chief architect and historic preservation officer Keith Venter receives an exceptional achievement award in 2015 "for outstanding, innovative approaches in operations management supporting NASA's commitment to preserving our Nation's historic treasures." (Photo credit: NASA)

Center, and Johnson Space Center to present a paper about digital archiving.

ARC's history staff would like to bid a fond farewell to the Center's longtime historic preservation officer and chief architect, Keith Venter, who retired at the turn of the year. He was a wonderful manager and mentor for over a decade, and he will be greatly missed. In his 32 years of service to NASA, Keith's many contributions to the Center included running an exemplary historic preservation program. During his tenure, responsibility for Moffett Federal Airfield was transferred to NASA and portions added to the National Register of Historic Places as the Shenandoah National Historic District. Historic buildings within this district were adapted for reuse to form the heart of the NASA Research Park now occupied by a thriving community of federal, academic, and commercial partners. In addition, the NASA Ames Research Center Wind Tunnel District, Arc Jet Complex, Flight and Guidance Simulation Laboratory, and Ames Administration Building were all listed in the National Register of Historic Places during his watch. Jonathan Ikan has stepped in to fill Keith's shoes as the Center's new architect and cultural resources manager. Welcome to Jonathan and best wishes to Keith for a happy retirement.

GLENN RESEARCH CENTER (GRC)

Cleveland, Ohio

By Anne Mills

Glenn Research Center marked the 77th anniversary of our groundbreaking on 23 January 2018. This year also marks 75 years since the culmination of construction of the lab and the beginning of significant research and notable activities. Throughout 2018, we will be working with our Center social media team to increase historical content on those channels—so be sure to follow us on Instagram (<https://www.instagram.com/nasaglenn/>), Twitter (<https://twitter.com/NASAglennt>), and Facebook (<https://www.facebook.com/NASAGlenn>). We'll be sharing materials from our archives and marking significant anniversaries.

This year, 20 May 1872 marks the 75th anniversary of the official dedication of the lab. The ceremony marked the completion of construction of the original planned structures. A modest and patriotic observance marked the occasion, as the country had become fully involved in the war since the time of the Center's groundbreaking in January 1941. On 20 May 1943, National Advisory Committee for Aeronautics (NACA) dignitaries and Cleveland civic dignitaries gathered



This photo was taken during the visit of the Memphis Belle bomber to the AERL (now Glenn Research Center).

on a grandstand in front of the Administration building to address the Aircraft Engine Research Laboratory's (AERL's) 1,200 employees and the press. Of particular note was the attendance of NACA committee member Dr. Orville Wright. Dr. Jerome Hunsaker, Chairman of the NACA, presided over the ceremony, and speeches were presented by NACA members Major General Oliver Echols, Rear Admiral Ernest Pace, and Dr. George Lewis. Cleveland Mayor Frank Lausche gave a keynote address. The theme of the day was the importance of the laboratory's support of the war effort and the resolution that the work done within its facilities would ensure the nation's success. However, the take-away message was that once the war was won, AERL would still have a sustained mission to continue advancing aircraft engine technology. The ceremony concluded with the official presentation and raising of the flag over the laboratory. W. T. Holliday of the Cleveland Chamber of Commerce presented the flag to NACA Secretary John Victory with these words: "In your hands I place this flag, emblem of all we hold dear, emblem of all we are fighting for. I bid you cherish it, fly it high, and keep it flying." John Victory then

presented the accepted flag to lab manager Edward Sharp, who handed it over to the guards for raising.

Following the ceremony, the NACA inspected the newly completed facilities, including the Engine Research Building, Fuels and Lubrication Lab, Propeller Test House, Technical Services Building, Altitude Wind Tunnel, and Hangar. The tour culminated with the first NACA meeting to be held at the Center.

As we acknowledge the 75th anniversary of our dedication, and soon the 60th anniversary of the establishment of NASA, it's important to stop and ask, "Why?" Anniversaries are a great source of pride and inspiration—and, even better, a chance to learn about the story behind decisions, the times that shaped the event, and the impact of our choices. Learning more about the context of historical events gives us a better understanding and awareness of why things are the way they are today and are a great exercise in critical thinking—as beneficial to the scientist and researcher as it is to the historian. NASA loves its anniversaries, and I'm so glad it does!



Stuka, the crew's mascot, sits on the tarmac under the Memphis Belle bomber.

Remembering the Visit of the Memphis Belle

Photos from the 1943 visit of the Memphis Belle to GRC (then known as the NACA AERL) were recently featured on the military history site <http://www.warbirdsnews.com>. The aircraft was parked at the lab as part of a three-day visit to Cleveland during a nationwide war bond drive. The crew of the Memphis Belle were among a number of celebrated military luminaries to tour the lab and express appreciation to the staff for their support of the war effort.

The plane and crew arrived on 7 July 1943. Below is a photo of the crew, along with lab manager Raymond Sharp and several local dignitaries. Also on board was the crew's mascot, a Scottish terrier named Stuka.

If your travels will take you near southwest Ohio in the near future, the Memphis Belle will go on permanent display at the National Museum of the United States Air Force in Dayton, Ohio. The exhibit opened on 17 May.

JOHNSON SPACE CENTER (JSC)

Houston, Texas

By John Uri

First Quarter

In the third quarter of 2017, we had a hurricane. This time, a deep freeze, including three snowfalls this winter—a highly unusual event for Houston. The Center closed for two days, but unlike after Hurricane Harvey, there was no lasting impact, and within days temperatures were seasonal again.

Then, in the first quarter of 2018, planning was well under way for the 2018 NASA History Program Annual Review, but it has now been canceled. The JSC History Office had scheduled the meeting for 24–26 April at the White Sands Test Facility near Las Cruces, New Mexico.

We continue to expand our extensive oral history collection by completing the transcription process for the 45 interviews undertaken on behalf of the NASA Headquarters History Office, the JSC Knowledge Management Office, and the NASA Science Mission Directorate in fiscal year 2017. We have also begun our planned fiscal year 2018 interviews. The transcripts will be uploaded to the JSC History Portal once the subjects have approved them for release.

In anticipation of upcoming major anniversaries of significant space events, the JSC History Office has been included in working groups led by the JSC External Relations Office (ERO) to commemorate those events. One group planned a commemorative event for the 15th anniversary of the Columbia accident. The event, held on 31 January, included a panel

discussion with former Kennedy Space Center Shuttle Launch Director Mike Leinbach, former Shuttle Program Manager Wayne Hale, Orion Program Manager Mark Kirasich, Commercial Crew Program Manager Kathy Lueders, and Chief of the Astronaut Office Pat Forrester. Another group is planning events leading up to the 50th anniversary of the first Moon landing in July 2019, with a special focus on the Apollo 7, 8, and 11 missions. A commemoration of the Apollo 13 flight also will occur in April 2020. A major contribution from the History Office is a series of short articles in *JSC Today* that highlight the anniversaries of less celebrated events and people that were nevertheless crucial to achieving the Moon landing within President Kennedy's timetable. These articles also appear on the JSC home page as well as on JSC's Facebook and Twitter accounts. We have received excellent support from other Center History Offices in the production of these. A third group will soon be established to plan for events surrounding NASA's 60th anniversary.

In January and February, JSC Historian Jennifer Ross-Nazzal gave three talks at Space Center Houston, our visitor's center, about America's presidents and key NASA anniversaries: President Richard M. Nixon's approval of the Space Shuttle on 5 January 1972; President Ronald Reagan's directive to NASA to build a space station in his State of the Union address on 25 January 1984; and, finally, the renaming of the Manned Spacecraft Center after former President Lyndon B. Johnson on 17 February 1973. The



Special appearance

Hear from NASA historian
Jennifer Ross-Nazzal

Jan. 4, 24 and Feb. 15
spacecenter.org/special-events

SPACER CENTER
HOUSTON

Manned Space Flight Education Foundation

spacecenter.org

NASA historian Jennifer Ross-Nazzal gave three talks at Space Center Houston in January and February.

response from Space Center Houston visitors, including a few NASA retirees, has been positive.

We welcomed our spring intern, Jonathan Norori, who will continue to make significant progress on upgrading the JSC History Portal. While Jonathan will have other commitments in the JSC Knowledge Management Office, we hope to complete the revamp of the portal.

Second Quarter

We are grateful that we endured the past quarter without any significant weather event worthy of note. Houston's winter was reluctant to make way for spring, but come August, we'll remember fondly the crisp April mornings.

We continue to expand our extensive oral history collection. Recently, we completed interviews with former astronauts William McArthur and Robert "Hoot" Gibson. Two days before her retirement in May, our team interviewed Center Director Ellen Ochoa. Sandra Johnson and Jennifer Ross-Nazzal also traveled to Philadelphia to interview Allan Klumpp, principal designer of the Lunar Module on-board descent software. The transcripts of the interviews will be uploaded to the JSC History Portal once the subjects have approved them for release.

In February, the JSC History Office received word of the death of Michael O'Brien, who was instrumental in securing the agreements establishing the International Space Station. The oral history team interviewed him for the NASA at 50 oral history project and book and recently interviewed him again as part of the ongoing NASA Headquarters Oral History Project. The *Washington Post* quoted from his NASA at 50 oral history and provided a direct link to his oral history transcript: https://www.washingtonpost.com/local/obituaries/michael-obrien-nasa-diplomat-who-oversaw-agreements-for-the-international-space-station-dies-at-72/2018/02/28/891a5966-1b47-11e8-b2d9-08e748f892c0_story.html?utm_term=.c2a34a971d1e.

As part of observing upcoming anniversaries of significant space events, the JSC History Office is working with the JSC External Relations Office on a continuing series of articles posted on the www.nasa.gov site and JSC's Facebook and Twitter accounts. Abstracts of the articles appear online in JSC's *Roundup Today*. The articles highlight the anniversaries of less-celebrated events, as well as people who were less well known but were nevertheless crucial to achieving the Moon landing within President Kennedy's timetable. We want to thank our colleagues at Ames, Armstrong, the Jet Propulsion Laboratory (JPL), Kennedy, Marshall, and Stennis, who have all contributed in some way to these articles.

Over the past few months, our historian has been on the road—twice in one week. Starting at the end of February, Ross-Nazzal spoke at the Neill-Cochran House in Austin on the impact of NASA on the Lone Star State. Just a few days later, she boarded a plane to Maryland, where she presented at “To Boldly Archive: Archiving for the Next Half Century of Space Flight” conference in College Park. In April, she flew to the West Coast to attend the Organization of American Historians (OAH) in Sacramento, California, where she and Layne Karafantis, Ames historian, met.

The JSC History Office has been working in collaboration with Kam Lulla of the JSC University Research, Collaboration and Partnership Office to find a university press to publish Jennifer Ross-Nazzal's book *Making Space for Women*. John Uri and Ross-Nazzal traveled to Texas A&M University Press with Dr. Lulla and met with the editor-in-chief to discuss the book's possible publication. The initial meeting was very positive, and we will take the next steps to submit the manuscript to Texas A&M Press.

Our spring intern, Jonathan Norori, continues to make significant progress on upgrading the JSC History Portal. Although Jonathan had other commitments in the JSC Knowledge Management Office, we hope to complete the revamp of the portal and release a new look soon.

LANGLEY RESEARCH CENTER (LARC)

Hampton, Virginia

By Rob Wyman

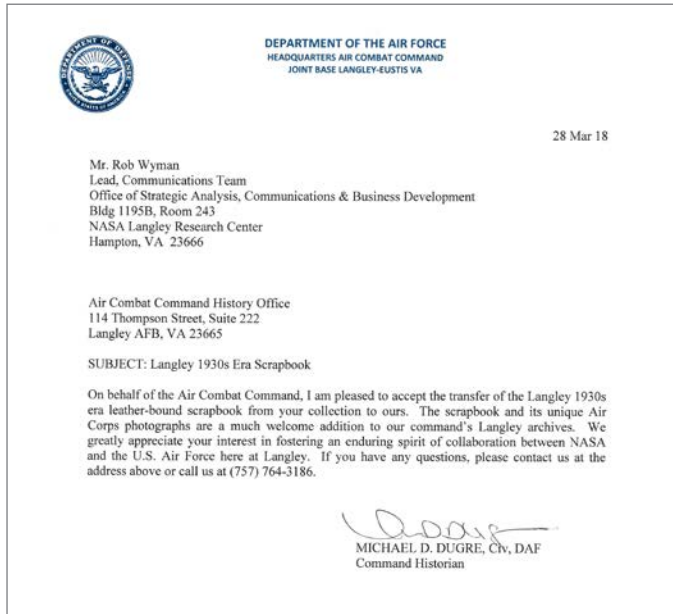
On 10 April 2018, we returned a 1930s-era photographic scrapbook to the United States Air Force (USAF) Air Combat Command (ACC) next door at Joint Base Langley-Eustis.

Our intern, Melissa Jones, found it in the archive and I asked her to research its disposition.

After interviews with a NASA photo archivist, as well as now-retired NASA cultural resource officers and historical liaisons, she determined that the scrapbook had been left here at NASA by a member of the public and that it wasn't associated with NASA Langley or its predecessor organization, the NACA Langley Memorial Aeronautical Laboratory.



Intern Melissa Jones (right) looks over the 1930s-era photographic scrapbook.



Here is a letter with the Center Director's signature to the ACC's deputy commander, Major General John McMullen.

She then turned to our neighbors at the Air Force and connected with their deputy command historian, Bill Butler. He reviewed the artifact and determined that the photos of all the aircraft, buildings, people, and objects appeared to be USAF-related and were more than likely taken either by an Air Force employee or by a family member there at Langley Field during the early 1900s.

Melissa did a great job, and because we had someone who could invest the time and effort into working on this, we were able to return the artifact to its “rightful” owner, who can more thoroughly research and better preserve it.

STENNIS SPACE CENTER (SSC)

Stennis Space Center, Mississippi

By Jessica Herr

First Quarter: 40th Anniversary of the Groundbreaking for the MSAAP

One thing Jackson Balch tried to do as Director of the Mississippi Test Facility (MTF) was to bring agencies and organizations together so that their work and

research would benefit one another. In 1971, the U.S. Army was looking for a place to build a plant for their ammunition modernization program. This was a classified program named “Steel City.” At first, it was suggested that the Army survey Camp Shelby, just south of Hattiesburg, Mississippi, for their ammunition plant, but the Army had its sights on the MTF to the south. The Army estimated that the plant was going to cost \$500 million with a workforce of about 1,200 people—overwhelming numbers to the smaller installations on-site at the MTF. Balch also worried that the ammunition plant would overshadow the space and environmental work that was being done there. However, the Army did suggest some changes at MTF, such as engine testing possibly moving to another site in Florida—but NASA and Senator John C. Stennis kept to their word and said the decision had already been made that engine testing would stay at MTF.

The Army, MTF, and Senator Stennis all wanted to work together to make “Steel City” work. The Senate Armed Services Committee, which Senator Stennis chaired, gave the Army funding to begin construction

of the Mississippi Army Ammunition Plant (MSAAP). A lot was happening at MTF at that time: Jackson Balch was focusing on building up the agencies that would call MTF home, so he convinced Dr. George Constan, who was a former manager of Michoud Assembly Facility, to serve as the liaison between NASA and the Army. The building of “Steel City” began with the groundbreaking ceremonies 40 years ago on 10 January 1978. Senator Stennis joined Jerry Hlass, along with U.S. Representatives Trent Lott and Sonny Montgomery; Deputy Secretary of Defense Charles Duncan, Jr.; Secretary of the Navy W. Graham Clator, Jr.; Rear Admiral J. Edward Snyder, Jr.; and NASA Deputy Administrator Alan Lovelace. In his address at the groundbreaking ceremony, Senator Stennis congratulated the arrangement of agencies at the site, saying, “Today this Facility exists as a national model of federal agency coordination and cooperation.” More than 1,500 people from the surrounding area joined in on the celebration of this monumental facility.

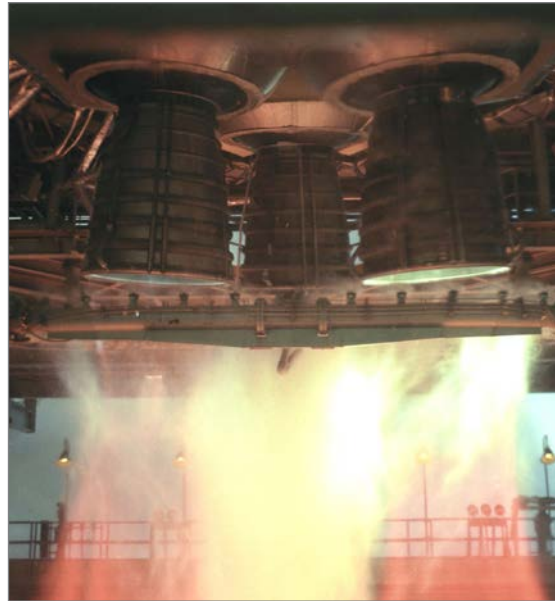
Second Quarter: A Look Back at the MPTA

In the 1970s, the Apollo era was coming to a close. Saturn rocket testing had ended at the Mississippi Test Facility, but a new engine roar was soon to be heard: the Space Shuttle main engine.

In 1971, the testing of the Space Shuttle main engines was assigned to the Mississippi Test Facility, and work began on modifying the test stands for this new endeavor.

The Space Shuttle main engine test project at Stennis officially began on 19 May 1975. The so-called “burp” test did not include full ignition of the engine. The first full-ignition Space Shuttle main engine test occurred on 12 June 1975. Twelve days later, on 24 June 1975, Stennis conducted the first full-duration Space Shuttle main engine test.

With single-engine testing under way, attention at the newly renamed National Space Technologies Laboratory squarely turned to testing the Shuttle’s main propulsion test article (MPTA). For that project, the site brought in the best test conductors in the country.



A trio of Space Shuttle main engines fire simultaneously during a test of the vehicle main propulsion test article on the B-2 Test Stand at Stennis. The series of tests to certify the design and operation of the Shuttle propulsion system was a critical milestone leading up to the maiden launch of the vehicle and is considered by many to represent one of Stennis’s finest hours. (Photo credit: Russ Underwood, Lockheed Martin Corporation)

The Shuttle MPTA consisted of three main engines, an external propellant tank, associated systems, and a simulated orbiter aft section. All of the components were installed on the B-2 Test Stand and the engines were test-fired simultaneously, just as during an actual launch, to prove that the propulsion system would operate as needed to power Shuttle flights.

The MPTA testing was critical due to the unique nature of the Shuttle design. Every previous rocket system was tested with uncrewed flights prior to launching human missions. That was not the case with the Space Shuttle. The first time it launched, it carried two astronauts, who were relying on the work that had been done at Stennis to carry them safely to space.

Harry Johnstone first led the program, and through the years, the MPTA test team members included Tom Baggette, John Plowden, Tom Lyddon, Marv Carpenter, Lou Nelson, Boyce Mix, Doug Howard, and Bill Lindsey, just to name a few.

In March 1978, the MPTA test team went through a Firing Readiness Review that was done by NASA's Review Board. Each element and part of the operation was reviewed, and at the end of the extensive two-day session, the operation received the thumbs-up for test firing.

So, on 21 April 1978, 40 years ago, the first Shuttle MPTA test was conducted on the B-2 stand at 11:34 a.m. The hot fire was only 1.90 seconds and signaled by just a small puff of smoke, but it was an important chapter in testing history at what is now Stennis Space Center.

OTHER AEROSPACE HISTORY NEWS

BRIAN ODOM OF MARSHALL SPACE FLIGHT CENTER RECEIVES NASA HISTORY AWARD

By Bill Barry

The Headquarters History Division presents the annual NASA History Program Award each spring to recognize a NASA employee who has excelled in

the promotion of NASA history inside and outside the Agency. Nominations come from fellow NASA archivists and historians.

Dr. Brian Odom received the annual NASA History Program Award in recognition of his outstanding dedication and leadership in serving both Marshall Space Flight Center (MSFC) history and aerospace history. His nomination noted his outstanding work



Dr. Brian Odom receives the annual NASA History Program Award for 2017 in recognition of his outstanding dedication and leadership in serving Marshall Space Flight Center history. (Photo credit: NASA/MSFC/Jonathan Deal)

in 2017 in a number of spheres. Foremost among these were his outstanding efforts in organizing the “NASA in the ‘Long’ Civil Rights Movement Symposium” in Huntsville, 16–17 March 2017. This was a well-organized event on a subject of great public interest and relevance. In addition to the symposium itself, Brian has led efforts to publish a collection of papers from the event for the record. He immediately followed up on this initiative by commencing work on a followup event (scheduled for 2019) entitled “NASA in the South.” For most people, just doing their regular work while taking on the organization of a symposium and a book based on it would be an incredibly busy and productive year. But Brian was also finishing work on his doctoral degree at the same time. In recognition of his outstanding dedication and leadership in serving both Marshall Space Flight Center history and aerospace history more generally, Brian was presented with the annual NASA History Program Award for 2017. Congratulations, Brian!

NASA IN THE SOUTH SYMPOSIUM

28–29 March 2019, University of Alabama in Huntsville

By Brian Odom

Federal spending for the space program during the Cold War had a transformative effect on the southern United States. NASA funding for the Apollo program alone constituted an investment of \$25 billion (in 1960s dollars), or nearly 4 percent of the federal budget at its peak in 1965. NASA’s decision to construct most of its major new facilities in the South—including those in Alabama, Florida, Mississippi, and Texas—also represented a major investment worth more than \$2.5 billion in the fiscal years 1962 and 1963 alone. Beyond the initial investment, the presence of those vast, federally funded technology development centers continues to exert a major influence on Southern society and politics. With so many of NASA’s development, manufacturing, and management centers situated in the South, southern politics and society

have also profoundly impacted NASA’s organizational culture, causing it to “speak with a Southern accent.” As Loyd S. Swenson, Jr., argued in his 1968 essay on the topic, the South deserved much of the credit for developing the technology for the Apollo program. However, there was also a hope that the “reaction engines for space” might compel the region to “leave behind reactionary thought.”¹



IN RECOGNITION OF THE APOLLO 50TH ANNIVERSARY AND ALABAMA BICENTENNIAL, NASA’S MARSHALL SPACE FLIGHT CENTER AND THE UNIVERSITY OF ALABAMA IN HUNTSVILLE (UAH) WILL HOLD A SYMPOSIUM ON THE UAH CAMPUS ON 28–29 MARCH 2019 TO EXAMINE THE ECONOMIC, SOCIAL, AND POLITICAL IMPACT NASA HAS HAD ON THE SOUTH OVER THE PAST 60 YEARS....



In recognition of the Apollo 50th anniversary and Alabama bicentennial, NASA’s Marshall Space Flight Center and the University of Alabama in Huntsville (UAH) will hold a symposium on the UAH campus on 28–29 March 2019 to examine the economic, social, and political impact NASA has had on the South over the past 60 years and to explore how that “Southern accent” has affected the development of NASA’s organizational culture, technological development, and

1 Loyd S. Swenson, Jr., “The Fertile Crescent: The South’s Role in the National Space Program,” *Southwestern Historical Quarterly* 71, no. 3 (January 1968): 377–392.



Alabama Governor George Wallace (left), NASA Administrator James Webb, and Marshall Space Flight Center Director Dr. Wernher von Braun tour MSFC on 8 June 1965. Wallace and Webb were at MSFC to witness the first test-firing of a Saturn V booster, along with members of the Alabama legislature and press reporters. (Photo credit: NASA/MSFC)

programmatically goals. The intention is to publish a selection of the papers as an anthology.

Topics for consideration include, but are not limited to, the following:

- Gender/labor/race/environmental studies
- Aerospace tourism and museums
- Lyndon Johnson and Jimmy Carter as Southern Presidents and their influence on NASA policy
- Impact on science, technology, engineering, and mathematics (STEM) education at regional academic institutions
- Impact of NASA on Southern politics and vice versa
- “Southernness” of NASA organizations
- Immigration/migration to the South
- Impact of the Cold War and international cooperation
- Development of the new Sunbelt middle class
- Infrastructure for technology development
- Development of aerospace industry across the South
- Impact of work on various programs—Apollo, Shuttle, International Space Station (ISS), Hubble, etc.
- Impact of congressional seniority system on funding/development
- Oral histories and archival collections

Submission Procedures

If you wish to present a paper, please send an abstract of no more than 400 words and a short biography or curriculum vitae, including current affiliation, by 1 January 2019 to Brian C. Odom at brian.c.odom@nasa.gov or Stephen P. Waring at warings@uah.edu.

Individual presentations or roundtable proposals are due on 1 January 2019.

To see the call for papers, visit <https://www.nasa.gov/centers/marshall/history/nasa-in-the-south-symposium.html>.

AMERICAN ASTRONAUTICAL SOCIETY HISTORY COMMITTEE

By Michael Ciancone, Chair

American Astronautical Society History Series

Univelt has published two more volumes in the American Astronautical Society (AAS) History Series of proceedings from International Astronautical Congress (IAC) History sessions:

- Tal Inbar, ed., *History of Rocketry and Astronautics: Proceedings of the Forty-Ninth History Symposium of the International Academy of Astronautics (IAA)*, vol. 47, AAS History Series (Jerusalem, Israel: Univelt, 2015).
- Pablo De León, ed., *History of Rocketry and Astronautics: Proceedings of the Fiftieth History Symposium of the International Academy of Astronautics (IAA)*, vol. 48, AAS History Series (Guadalajara, Mexico: Univelt, 2016).

2017 Emme Award for Astronautical Literature

The Emme Award Selection Panel, chaired by Don Elder, is in the process of considering titles for this annual award. The recipient of the 2017 award will be announced in September.

2018 Ordway Award for Sustained Excellence

The Ordway Award Selection Panel is accepting nominations for the 2018 award. Nomination forms are located on the AAS Web site at <http://astronautical.org/awards/ordway/>

NASA HISTORY PROGRAM DIGITAL ARCHIVES WORKING GROUP

The NASA History Program recently formed a Digital Archives Working Group (DAWG) to collectively address challenges associated with digital archiving, from establishing guidelines for submissions from historical content creators to exploring tools and methodologies, with an eye toward knowledge sharing, problem solving, and identifying opportunities for collaboration. The group's membership comprises representatives of NASA history program archives from Ames Research Center, Goddard Space Flight Center, the Jet Propulsion Laboratory, Johnson Space Center, Langley Research Center, NASA Headquarters, Stennis Space Center, and the University of Houston–Clear

Lake. Holly McIntyre-DeWitt from Goddard and April Gage from Ames cochair the group with input from NASA's acting Chief Archivist, Steve Garber. DAWG has two primary aims. The first is to formulate guidelines and good practices for capturing historical research data and products commissioned by NASA, with a focus on digital forms. The second is to formulate recommendations for toolkits, standards, policies, and practices for building digital repositories, and for processing, preserving, and providing access to holdings. Preparations for launching the working group began in November 2017, and the first biweekly meeting was held in February 2018.

RECENT PUBLICATIONS

COMMERCIALY PUBLISHED WORKS

Compiled by Chris Gamble

Foreword to Spaceflight, by Michael L. Ciancone (Apogee Books, April 2018). This book provides an update to Michael L. Ciancone's *The Literary Legacy of the Space Age*. This update offers a unique resource for book collectors and historians alike through hundreds of annotated entries that identify books published before Sputnik on what the author refers to as "speculative non-fiction" related to the use of rockets for spaceflight. It contains entries for titles published in Danish, Dutch, English, French, German, Italian, Norwegian, Spanish, Swedish, and Russian. Notable in this edition is the inclusion of colorful images of the covers of many of the entries. In addition, the author (along with Professor Asif Siddiqi, the world's foremost authority on Soviet spaceflight history) has provided a unique appendix of Russian titles published in the former USSR.

First Man: The Life of Neil A. Armstrong (Revised Anniversary Edition), by James R. Hansen (Simon & Schuster, 2018). On 20 July 1969, the world stood still to watch 38-year-old American astronaut Neil Armstrong become the first person to step on the surface of another celestial body. This biography, now updated with a new chapter written after Armstrong's death, addresses the complex legacy of the "first man" as both an astronaut and an individual.

The Design and Engineering of Curiosity—How the Mars Rover Performs Its Job, by Emily Lakdawalla (Springer-Praxis, March 2018). This book describes the most complex machine ever sent to another planet: Curiosity. It is a 1-ton robot with 2 brains, 17 cameras, 6 wheels, nuclear power, and a laser beam on its head. This essential reference to the Curiosity mission explains the engineering behind every system on the rover—from its rocket-powered jetpack, to its radioisotope thermoelectric generator, to its fiendishly complex sample-handling system. The book explains

how all the instruments work, and it explains the grueling mission operations schedule that keeps the rover working day in and day out.

The Grand Designers: The Evolution of the Airplane in the 20th Century, by John D. Anderson, Jr. (Cambridge University Press, March 2018). In this groundbreaking work based on new research, the author, a curator at the Smithsonian National Air and Space Museum, analyzes the historical development of the conceptual design process of the airplane. He aims to answer the question of whether airplane advancement has been driven by a parallel advancement in the intellectual methodology of conceptual airplane design. In doing so, Anderson identifies and examines six case histories of "grand designers" in this field, and he challenges some of the preconceived notions of how the intellectual methodology of conceptual airplane design advanced.

Building Habitats on the Moon: Engineering Approaches to Lunar Settlements, by Haym Benaroya (Springer-Praxis, January 2018). This book provides an overview of various concepts for lunar habitats and structural designs and characterizes the lunar environment—the technical and the nontechnical. The designs take into consideration psychological comfort, structural strength against seismic and thermal activity, and internal pressurization and $\frac{1}{6}$ g.

Space Resource Utilization: A View from an Emerging Space Faring Nation, edited by Annette Froehlich (Springer, January 2018). The book speaks to the need for a regulatory framework with regard to space resource utilization. In doing so, Froehlich explores significant elements of the subject matter, taking into account the different phases of a space mission and the perspectives of the various actors and participants in the space arena. Froehlich performs an analysis of the current national and international governance frameworks with regard to resource extraction and utilization in space. She analyzes the views of established

and emerging space nations next, specifically with extraction and utilization in mind, and in light of the new United States Commercial Space Launch Competitiveness Act (CSLCA) of 2015.

India in Space: Between Utility and Geopolitics, by Marco Aliberti (Springer, January 2018). This book presents the renewing strategic vision and progressive diversification of the Indian space program at the nexus of socioeconomic development, commerce, and geopolitics.

The Future of Humanity: Terraforming Mars, Interstellar Travel, Immortality, and Our Destiny Beyond Earth, by Michio Kaku (Doubleday, February 2018). Physicist and futurist Michio Kaku explores the process by which humanity may gradually move away from the planet and develop a sustainable civilization in outer space.

The Earth Gazers: On Seeing Ourselves, by Christopher Potter (Pegasus Books, February 2018). Some of the most beautiful and influential photographs of Earth ever made were taken by the astronauts of the Apollo space program from the Moon. They inspired a generation of scientists and environmentalists to think more seriously about our responsibility for this “blue marble.” *The Earth Gazers* is a book about the long road to the capture of those unforgettable images.

Verner Suomi: The Life and Work of the Founder of Satellite Meteorology, by John Lewis, Jean M. Phillips, W. Paul Menzel, Thomas H. Vonder Haar, Hans Moosmüller, Frederick B. House, and Matthew G. Fearon (American Meteorological Society, February 2018). This book tells the story of Finnish-American educator, inventor, and scientist Verner Suomi, whose early work in a Depression-era Civilian Conservation Corps camp led to an opportunity to attend teaching college; then, during World War II (WWII), he became a meteorological trainee in the University of Chicago’s Cadet program. He steadily advanced in academia and went on to found the Space Science and Engineering Center at the University of Wisconsin–Madison, where many of today’s major observing

systems for spacecraft, aircraft, and ground-based platforms are developed. In 1959, Suomi’s work resulted in the launching of Explorer VII, a satellite that measured Earth’s radiation budget, a major step in our ability to understand and forecast weather. Drawing on personal letters and oral histories, this biography presents a picture of the successful person who helped launch the field of satellite meteorology.

Discovering Pluto: Exploration at the Edge of the Solar System, by Dale P. Cruikshank and William Sheehan (University of Arizona Press, February 2018). Telling the tale of Pluto’s discovery, the authors recount the grand story of our unfolding knowledge of the outer solar system, from William Herschel’s serendipitous discovery of Uranus in 1781, to the mathematical prediction of Neptune’s existence, to Percival Lowell’s studies of the wayward motions of those giant planets leading to his prediction of another world farther out. Lowell’s efforts led to Clyde Tombaugh’s heroic search and discovery of Pluto—then a mere speck in the telescope—at Lowell Observatory in 1930.

Yearbook on Space Policy 2016: Space for Sustainable Development, edited by Cenan Al-Ekabi and Stefano Ferretti (Springer, February 2018). The Yearbook on Space Policy, produced by the European Space Policy Institute (ESPI), is a reference publication that analyzes space policy developments. Each year’s volume presents issues and trends in space policy and the space sector as a whole. Its scope is global, and its perspective is European. The Yearbook also links space policy with other policy areas. It highlights specific events and issues and provides useful insights, data, and information on space activities.

National Space Legislation: A Comparative and Evaluative Analysis, edited by Annette Froehlich (Springer, February 2018). The purpose of this report is to provide a comparative analysis that will detail the similarities and differences between the national space laws of selected states with a focus on European comprehensive national space legislation. The states discussed are Sweden, the United Kingdom, Australia, China, Belgium, the Netherlands, France, Austria,

Indonesia, Denmark, New Zealand, and Luxembourg. This report is intended to assist the efforts of states that are seeking to enact or revise national space legislation, not only by presenting the approaches taken by other states, but also by presenting, as far as possible, the rationale behind their approaches.

Sunburst and Luminary: An Apollo Memoir, by Don Eyles (Fort Point Press, March 2018). This book is the memoir of Don Eyles, who worked on Project Apollo from 1966 through 1972 and on the NASA space program in general until 1998, as a computer scientist at the Massachusetts Institute of Technology (MIT) Instrumentation Laboratory and the Charles Stark Draper Laboratory in Cambridge, Massachusetts. He created flight software for the lunar landing phase of the Moon missions and invented a sequencing system that is in use on the International Space Station.

The Rise of Private Actors in the Space Sector, by Alessandra Vernile (Springer, March 2018). This book provides a broad set of information on the rise of private actors in the space sector, organized into different topics covering the various trends that have shaped the space sector during the last decade. The book, written in a descriptive fashion, concludes with recommendations for future analytical research on the topic.

The Proton Launcher: History and Developments, by Christian Lardier and Stefan Barensky (Wiley-ISTE, March 2018). This book is divided into two parts: “The Proton in the East,” which relates the history of the launcher in the USSR/Russia, and “The Proton in the West,” which tells the history of the commercialization of the launcher in the West thanks to the American-Russian joint venture International Launch Services (ILS), founded in 1995.

The Space Barons: Elon Musk, Jeff Bezos and the Quest to Colonize the Cosmos, by Christian Davenport (PublicAffairs, March 2018). This book is the story of a group of billionaire entrepreneurs who are pouring their fortunes into establishing a new era of American space exploration. Nearly a half century after Neil Armstrong walked on the Moon, these “space

barons”—most notably Elon Musk and Jeff Bezos, along with Richard Branson and Paul Allen—are using Silicon Valley-style innovation to try to dramatically lower the cost of space travel and send humans into deep space.

A Telephone for the World: Iridium, Motorola, and the Making of a Global Age, by Martin Collins (Johns Hopkins University Press, March 2018). Focusing on Motorola’s Iridium venture, this book explores the story of globalization at a crucial period in U.S. and international history. As a planetary-scale technological system, the project became emblematic of this shift and of the role of the United States as geopolitical superpower. In its ambition, scope, challenges, and organizing ideas, the rise of Iridium provides telling insight into how this new global condition stimulated a re-thinking of corporate practices—on the factory floor, in culture and knowledge, and in international relations. Combining oral history interviews with research in corporate records, Collins discusses what “global” meant in the years just before and after the end of the Cold War.

NASA Skylab Owners’ Workshop Manual, by David Baker, Haynes Manuals series (Haynes Publishing U.K., March 2018). This book describes the technical, design, and engineering details of how Skylab was built and operated.

Rocket Billionaires: Elon Musk, Jeff Bezos, and the New Space Race, by Tim Fernholz (Houghton Mifflin Harcourt, March 2018). This business narrative describes the new “race for space,” focusing on Elon Musk, Jeff Bezos, and the other major players and corporations.

Space Science and the Arab World: Astronauts, Observatories and Nationalism in the Middle East, by Jörg Matthias Determann (I.B. Tauris & Co. Ltd., April 2018). This book identifies the individuals, institutions, and national ideologies that enabled Arab astronomers and researchers to gain support for space exploration when Middle East governments lacked interest.



These three astronauts are the prime crew of the Apollo 8 lunar orbital mission. From left to right are James A. Lovell, Jr., Command Module pilot; William A. Anders, Lunar Module pilot; and Frank Borman, commander. They are standing beside the Apollo Mission Simulator at Kennedy Space Center (KSC) on 13 November 1968. (Photo credit: NASA)

Rocket Men: The Daring Odyssey of Apollo 8 and the Astronauts Who Made Man's First Journey to the Moon, by Robert Kurson (Random House, April 2018). This book tells the inside, lesser-known story of NASA's boldest and riskiest mission: Apollo 8, humankind's first journey to the Moon, on Christmas in 1968. *Rocket Men* is a riveting account of three heroic astronauts who took one of the most challenging spaceflights ever.

Space Odyssey: Stanley Kubrick, Arthur C. Clarke, and the Making of a Masterpiece, by Michael Benson (Simon & Schuster, April 2018). Celebrating the 50th anniversary of the film's release, author Michael Benson explains how *2001: A Space Odyssey* was made, telling the story primarily through the two people most responsible for the film, Kubrick and science fiction legend Arthur C. Clarke. Benson interviewed Clarke many times and has also spoken at length with

Kubrick's widow, Christiane; visual effects supervisor Doug Trumbull; Dan Richter, who played *2001*'s leading man-ape; and many others.

Saturn V: America's Rocket to the Moon, by Eugen Reichl, America in Space Series (Schiffer, April 2018). This book, part of the America in Space series, tells the gripping story of the development and creation of the Saturn V in concise, detailed text and features numerous high-quality color images, technical drawings, and specification/dimension charts. As well as a detailed look at the Saturn V's design and construction, all 32 Apollo missions are discussed, including the later Skylab and Apollo-Soyuz Test Project.

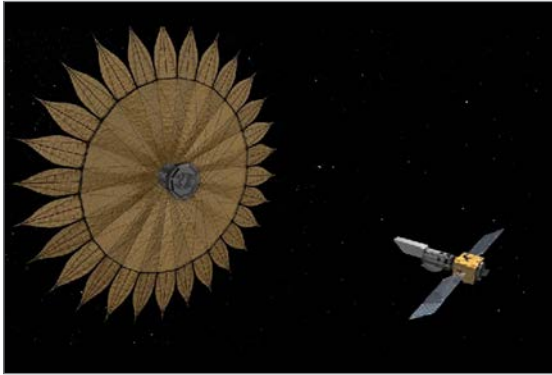
Space Exploration: Past, Present and Future, by Carolyn Petersen (Amberley Publishing, April 2018). The author takes the reader on a journey from the first space pioneers and their work, through World War I-led technological advances in rocketry that formed the basis for the Space Age, to the increasing corporate interest in space.

Jupiter, by William Sheehan and Thomas Hockey, Kosmos series (Reaktion Books, April 2018). Jupiter was the "beloved star" of the ancient Sumerians and Babylonians, the first serious observers of the planets, and the Pioneer and Voyager spacecraft visited it in the 1970s. Now it is being scrutinized as never before by NASA's Juno spacecraft, as experts begin to have a comprehensive view of the origin, composition, and structure of this gas giant world. This volume ranges across the entire history of Jupiter studies, from the naked-eye observations of the Babylonians and the Greeks, through the telescopic discoveries of Galileo and T. E. R. Phillips, to the explosion of information received from space probes. It brings our understanding of Jupiter right up to date and includes preliminary findings from the Juno space probe.

Disclaimer: The History Division wishes to thank volunteers Mike Ciancone and Chris Gamble, who compiled this section for us. Please note that the descriptions have been derived by Chris and Mike from promotional material and do not represent an endorsement by NASA.

UNFOLDING HISTORY

By Allison Gasparini, Spring 2018 NASA History Intern



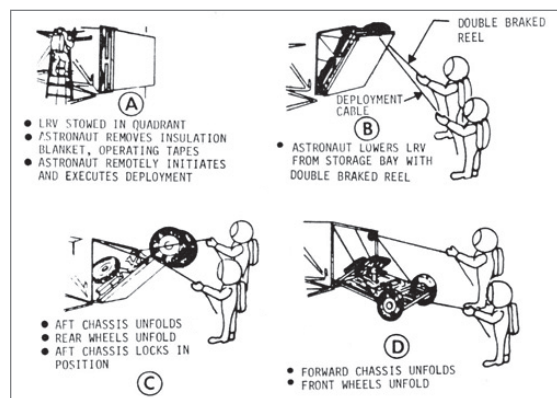
Working in conjunction with a space-based telescope, Starshade is able to position itself precisely between the telescope and the star that is being observed, and it can block the starlight before it even reaches the telescope's mirrors. (Photo credit: NASA/JPL/Caltech)

At the NASA Jet Propulsion Laboratory (JPL), a team of engineers is hard at work on a project known as Starshade. Starshade is a giant flower-shaped screen that would be positioned exactly between a space telescope and the star being observed, working by blocking out starlight so that exoplanets, specifically those that are Earth-like, can be directly imaged. To many, it is an essential piece of the puzzle to our future of discovery. However, at 30 meters in diameter, or about 100 feet, Starshade is roughly the size of a baseball diamond. This raises the question, how is something so large efficiently packaged for its route to space and then unpackaged for use? At JPL, the solution they found lies in the paper-folding art form of origami.

The problem of how to transport bulky gear into space is hardly a new one. With the dawn of the Apollo program, scientists began looking at how they could make their longtime dreams of a Moon buggy a reality, and they arrived at the conclusion that the answer would need to involve one thing: folding. This buggy, which was roughly the size of a small car, would need to fit into the Lunar Module, which also needed to carry two astronauts, along with various other instruments and supplies. There was no way such a large and bulky

vehicle would be making the trip unless they could find an effective way to store it. This problem came as a blow to the early assumptions of what the lunar rover would look like. Originally, it had been believed that the vehicle would be much larger, with a pressurized cabin, and that it would travel by a separate rocket from the astronauts; however, budgetary restrictions squashed these plans.

NASA began its search for collaborators who could design and build a four-wheeled buggy that would be compact enough to fit on the Lunar Module and lightweight enough that the astronauts could feasibly deploy it and use it once on the Moon. Not all were winners—John Jellinek of Bellcom submitted a concept for a “Crawler-Type Lunar Motor Transportation Vehicle” that then–NASA Director of Lunar Mission Studies Philip Culbertson responded to in 1966, saying, “It appears that a vehicle of this configuration could not be easily packaged”; he insisted that folding was necessary. Boeing ultimately won out with their 462-pound (77 pounds on the Moon) Lunar Roving Vehicle. The fender had to be made in several pieces so that it could fold and fit into the small storage quadrant on its flight to the Moon.



This diagram shows the lunar rover as seen in the *Lunar Rover Operations Handbook* published by NASA on 19 April 1971. It is available online at <https://www.hq.nasa.gov/alsj/43944200-Lunar-Rover-Operations-Handbook-07071971.pdf>.

Starshade cannot have any holes, gaps, rips, or tears, so breaking it down into several pieces like the Lunar Rover is not an option. The question of transporting bulky spacecraft has become more complex than it was in the early 1960s. In 1992, engineers Simon Guest and Sergio Pellegrino became the first to describe origami as a technique applied to the design of spacecraft with their paper “Inextensional Wrapping of Flat Membranes.” Their research was born from the need to package solar sails, which use sunlight propulsion to fly spacecraft. The sails needed to go from being 4 meters (13 feet) in diameter while wrapped to a 276-meter (900-foot)-diameter disk when deployed. Through the research, Pellegrino and Guest realized that in order to correctly mathematically describe a folding pattern, they would need to account for material thickness; this realization would become one of the most important factors in developing future folding designs.

As a thesis advisor at the California Institute of Technology, Pellegrino introduced origami as an engineering technique to one of his advisees, then-Ph.D. candidate Manan Arya. “I wasn’t into origami until [I worked] on folding spacecraft,” says Dr. Arya, who

received his Ph.D. in space engineering in 2016 and currently works as a technician on Starshade. Now? “I’m constantly folding,” he says with a laugh.

It is no coincidence that origami has been picked up by engineers as a serious point of inspiration. “There is a deep relationship between origami and mathematics,” Arya explains. He likens it to high school trigonometry and points to one particular pattern currently in use by Starshade engineers known as the “flasher pattern.” Arya describes it as a wrapping pattern, one in which the material wraps around a central hub. It is a pattern with a long history, according to Arya. “It was in the early ’90s that engineers used algorithms and mathematics to figure out how to fold the pattern into a compact configuration.” It is clear why the pattern is a popular choice among engineers: it has the ability to compress large spacecraft down to fractions of their original size.

The approach to folding large spacecraft has come a long way since the days of the Apollo Lunar Roving Vehicle. What is in store for the future? Arya wraps it up best: “There will always be a need for larger structures. Origami will continue to be very useful.”

UPCOMING MEETINGS

The 45th Symposium of the International Committee for the History of Technology (ICOHTEC) will be held **17–21 July 2018** in Saint-Étienne, France. Visit <http://www.icohtec.org/annual-meeting-2018.html> for details.

EAA (Experimental Aircraft Association) AirVenture will be held **23–29 July 2018** in Oshkosh, Wisconsin. Visit <https://www.eaa.org/en/airventure> for details.

The annual meeting of the Society of American Archivists (SAA) will be held **12–18 August 2018** in Washington, DC. Visit <https://www2.archivists.org/conference> for details.

The annual meeting of the Society for Social Studies of Science (4S) will be held **29 August–1 September 2018** in Sydney, Australia. Visit <http://www.4sonline.org/meeting> for details.

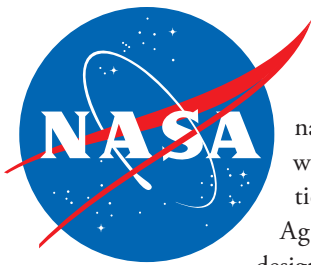
The annual meeting for the Society for the History of Technology (SHOT) will be held **11–14 October 2018** in St. Louis, Missouri. Visit <https://www.historyoftechnology.org/> for details.

The biennial Mutual Concerns of Aviation and Space Museums Conference will be held **2–6 November 2018** in Tucson, Arizona. Visit <https://airandspace.si.edu/events/mutual-concerns> for details.

A BRIEF LOOK AT THE NASA MEATBALL

By Maeve McBride, Spring 2018 NASA History Intern

The NASA insignia is one of the most recognizable symbols that NASA uses. Fondly (and at times not-so-fondly) called the meatball by employees, the insignia was created in 1959 by James Modarelli. It is printed on everything from internal correspondence to spacesuits and apparel sold to the public.



The 1958 Space Act officially established NASA to unify the nation's organizations that were working on aeronautics and astronautics. The Agency held a contest to design a seal to be used for official purposes. James Modarelli, head of Research Reports at NASA Lewis Research Center (now NASA Glenn Research Center), won this contest by combining imagery representing aeronautics and astronautics. He was then asked to simplify the design to make a logo that could be used informally.

Modarelli decided to combine aeronautics and astronautics in the logo as a way to embody the dual mission of NASA. In the design, the blue circle background, representing the planets; the stars, representing space; and the orbiting spacecraft all signify astronautics. The red supersonic wing, often called a swoosh or a vector, represents aeronautics. They are all tied together by the word "NASA" in white.

So what exactly is the red supersonic wing on both the insignia and the seal? The wing is a stylized version of a supersonic wing created by the National Advisory Committee for Aeronautics (NACA), which was folded into NASA. Modarelli viewed a model of the wing, created by researchers at Langley and Ames, during a visit to Ames in 1958. He decided that this cutting-edge technology would be the perfect way to embody aeronautics on the seal he was designing. When he designed the insignia, he once again incorporated the wing.

The NASA insignia was not always the meatball we know today. In 1975, the NASA insignia was replaced with the logotype insignia, affectionately nicknamed "the worm." This logotype promised a modern look by stylizing the letters "N A S A": the crossbars of the A's were removed, and some letters were linked. Frank "Red" Rowsome, head of technical publications at NASA Headquarters, called Modarelli's insignia "the meatball" to differentiate it from the new logotype insignia.



Administrator Dan Goldin brought the meatball back in 1992. The change was an effort to remind employees and the world about the glory days of fast-paced innovation and the Moon landings in the 1960s and '70s. The change was not without controversy. Individual employees campaigned for the logotype or Modarelli's insignia. Mockups of "wormballs" that combined the two logos were proposed, but clarity of messaging is important with logos, and the insignia (meatball) has been the officially approved logo since 1992.



"Wormballs," as in this example, are not approved for official use.

The meatball is perhaps the most visible symbol of NASA and has been seen in the Agency's most publicized moments. It flew on the spacesuits of Mercury, Gemini, and Apollo astronauts. It launched on the wings of Space Shuttles. It decorates NASA buildings and airplanes. But perhaps most importantly, the NASA insignia artfully combines aeronautics and astronautics and reminds us all to keep innovating.

IMAGE IN NASA HISTORY

Astronaut Jim Lovell, Apollo 13 mission commander, reads a newspaper account of the safe recovery of the crew of the problem-plagued mission.

Lovell is shown on board the USS Iwo Jima, prime recovery ship for Apollo 13.



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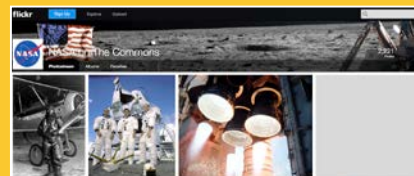
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