

NEWS & NOTES

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National Aeronautics and
Space Administration



CELEBRATING NASA'S 60TH ANNIVERSARY



60
NASA

**NASA AND UNIVERSITY
OF TEXAS AT DALLAS
REVEAL APOLLO 11 BEHIND-
THE-SCENES AUDIO**

**NEWS FROM HEADQUARTERS
AND THE CENTERS**

**UPCOMING APOLLO
DIALOGUES WORKSHOP**



NASA HISTORY DIVISION
OFFICE OF COMMUNICATIONS





FROM THE CHIEF HISTORIAN

This is different! You may be wondering what happened to NASA History *News & Notes*, but it's our birthday and we'll be creative if we want to. Turning 60, as NASA will do on 1 October this year, isn't an excuse to be boring. If anything, it is an incentive to reconsider and reinvigorate. Although we are putting a major effort into marking NASA's 60th anniversary, as well as the Apollo mission 50th anniversaries that will follow immediately afterward, NASA's History Program isn't only about the past. We need to continue to study our history with an eye on how it informs our present and future. And...once in a while, we need to shake things up a bit. I think that this special NASA 60th birthday cover design does just that.

“TURNING 60, AS NASA WILL DO ON 1 OCTOBER THIS YEAR, ISN'T AN EXCUSE TO BE BORING. IF ANYTHING, IT IS AN INCENTIVE TO RECONSIDER AND REINVIGORATE.”

Of course, we can always count on our interns to bring a fresh perspective to the History Division. This summer, Kate Wall and Savannah Jelks have been a great team—bringing a new voice to our social media accounts, writing blog posts, creating “Apollo for

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Millennials” products, and even writing articles for *News & Notes*. Don't let the snazzy cover distract you from reading the articles in here by Kate and Savannah. You don't want to miss them.

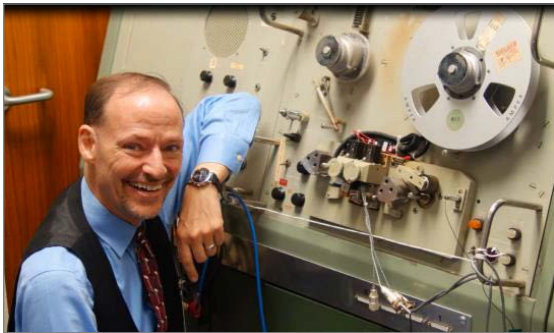
As for me, I'm going to shake things up by being brief for a change. (All right, I'm being brief here, but maybe not quite so much elsewhere in this issue.) And, with our cover for inspiration, maybe I'll just put on a Hawaiian shirt, find a comfy chair in the shade, and curl up with my own copy of *News & Notes*. I hope you're doing the same.

Happy reading and Godspeed NASA for at least another 60 years,

William P. Barry
Chief Historian

NASA AND UNIVERSITY OF TEXAS AT DALLAS REVEAL APOLLO 11 BEHIND-THE-SCENES AUDIO

Original article edited by Mark Garcia



John Hansen rewires and installs a newly designed and constructed 30-track read tape playback head.

Much of the world listened to the first Earth-Moon conversation at 4:18 p.m. EDT on 20 July 1969, when Neil Armstrong and Buzz Aldrin landed the Lunar Module Eagle with just 30 seconds of fuel remaining. Seconds after touchdown, Armstrong radioed, “Houston, Tranquility Base here. The Eagle has landed.” In Houston, Mission Control erupted in celebration as the tension broke, and capsule communicator (CAPCOM) and future moonwalker Charlie Duke offered the retort: “You got a bunch of guys about to turn blue. We’re breathing again.” You can listen to the audio here: https://www.nasa.gov/wav/62283main_landing.wav.

But the untold story of that momentous 8-day-and-3-hour mission by Armstrong, Aldrin, and Michael Collins was the round-the-clock support provided by Mission Control and many communications and support locations around the globe. The intrepid trio of space explorers lifted off at 9:32 a.m. on 16 July 1969 from Kennedy Space Center in Florida, landed on the Moon at 4:17 p.m. on 20 July, and lifted off from the Moon at 1:54 p.m. on 21 July. Splashdown in the Pacific Ocean occurred at 12:50 p.m. on 24 July.

Hundreds of audio conversations between the flight controllers and other teams supporting the mission

were going on every minute of the mission over an intricate intercom system. Multipurpose support rooms (MPSRs) coordinated every technical, planning, and management detail and decision with Mission Control and Apollo 11 flight directors Clifford Charlesworth, Gerry Griffin, Gene Kranz, and Glynn Lunney.

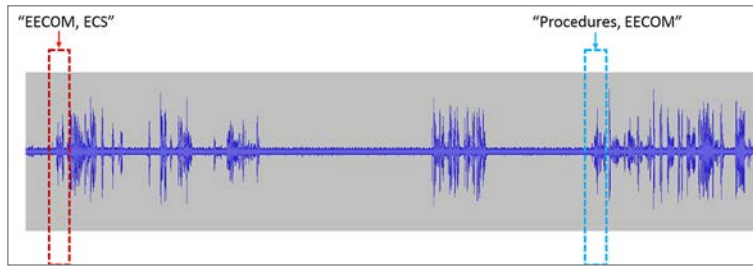
The conversations occurred over what are called communications “loops.” NASA fulfilled its responsibility to share its work with the American public by releasing the air-to-ground loops between the Apollo 11 crew and Mission Control to the news media and public as they happened.

Until now, however, the recordings of those myriad “backroom loops” in which individual experts discussed the details of their systems, and sometimes the details of their lives, have been locked away in specially built, climate-controlled vaults.

NASA’s Johnson Space Center (JSC) has the only functional remaining tape recorder capable of playing those approximately 170 remaining tapes. The time and effort of converting them to current digital formats was daunting and required the tape deck to be modified from being able to handle 2 channels at a time to handling the 30 channels on the historic tapes. Through a collaborative effort with the University of Texas at Dallas (UT Dallas), the conversion finally has been completed, and the unique perspective of those at the core of supporting humankind’s “giant leap” is available for anyone interested to download and listen to all 19,000 hours of audio recordings:

- NASA Collection: <https://go.nasa.gov/2yFz8zN>
- UT Dallas Collection: <https://app.exploreatpollo.org/>

“We’re approaching the 50th anniversary of Apollo, and I’m really pleased that this resource is becoming



Shown is an illustrated example of a conversation detection system; the red dotted box indicates conversation initiation by an environment control system (ECS) engineer, and the blue dotted box indicates when the Electrical, Environmental, and Consumables Manager (EECOM) initiates conversation with a procedure officer.

available,” said JSC Director Mark Geyer. “Experience is one of the best teachers, so as we continue our work to expand human exploration of our solar system to go back to the Moon and on to Mars, we stand on the shoulders of the giants who made Apollo happen. These tapes offer a unique glimpse into what it takes to make history and what it will take to make the future.”

“The effort,” said John H. L. Hansen, principal investigator for the effort, is a way “to contribute to recognizing the countless scientists, engineers, and specialists who worked behind the scenes of the Apollo program to make this a success. These are truly the ‘heroes behind the heroes’ of Apollo 11!”

Researchers at the Center for Robust Speech Systems (CRSS; learn more about them at <http://crss.utdallas.edu/>) in the Erik Jonsson School of Engineering and Computer Science (ECS; learn more about them at <https://engineering.utdallas.edu/>) received a National Science Foundation grant in 2012 to develop speech-processing techniques to reconstruct and transform the massive archive of audio into Explore Apollo (<https://app.exploreapollo.org/>), a Web site that provides public access to the materials. The project, in collaboration with the University of Maryland, included audio from all of Apollo 11 and most of the Apollo 13, Apollo 1, and Gemini 8 missions.

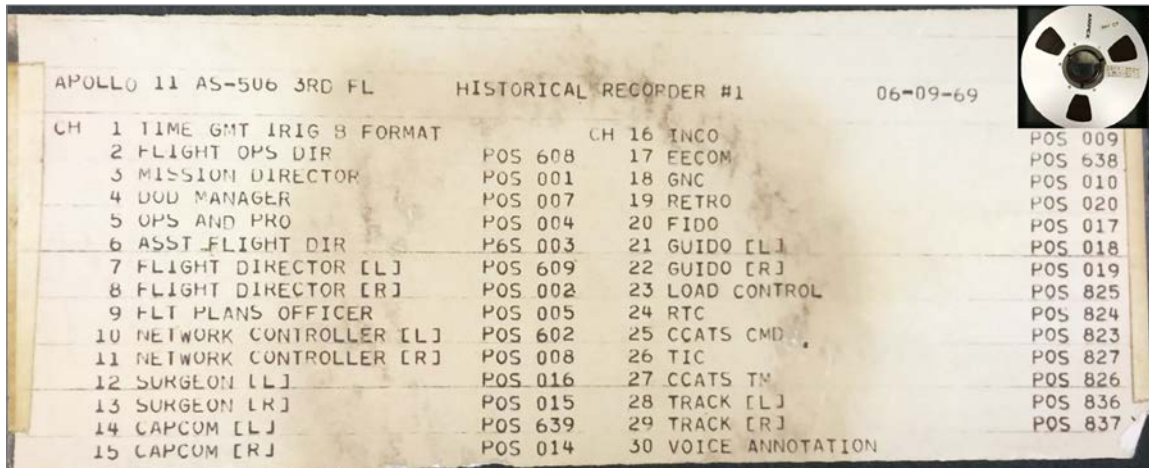
In addition to the life-and-death drama as the Lunar Module Eagle’s computer systems threatened to abort the landing, the conversations also provide insight into

the “humans in the loop” that made Apollo possible, including many humorous moments. Hansen noted one spot in the tapes where two NASA flight controllers are working with Buzz Aldrin because, for some reason, the sensor that measures his breathing is not operating properly. In the audio spot, they explore a number of reasons, ask questions, and maybe 10 to 15 minutes go by. Finally Buzz, in his own sense of humor, tells the NASA staff, “Well, if I stop breathing, I’ll be sure to let you know!”

In one example, Aldrin bemoans that fact that so much of Earth’s surface is water and asks if Mission Control can do anything about it; you can listen to him at http://www.nasa.gov/sites/default/files/atoms/audio/a11_t869_hr1u_ch15_buzz_-_turn_the_earth_a_little.mp3.

In another, the flight controller responsible for putting video on the large screens on the front wall of Mission Control offers a channel in which flight controllers could view black-and-white video at their consoles and is told by flight director Gene Kranz that those consoles are to be used for looking at data; you can listen to him at http://www.nasa.gov/sites/default/files/atoms/audio/a11_t876_hr1l_ch8_-_kranz_-_lookin_at_data.mp3.

Greg Wiseman, the project’s lead audio engineer for JSC’s Communications and Public Affairs Office, said the project began in late 2013 and was completed in early 2018. That may seem a long time, but considering that there were more than two years of audiotape to digitize, it is commensurate with the challenges that had to be overcome both with the historic audiotape record, which required special environmental storage conditions for preservation, and special procedures for replaying the tapes without damaging them or destroying the historic assets. He added that Johnson’s Audio Control Room continued to support International Space Station operations, news briefings, and other



APOLLO 11 AS-506 3RD FL		HISTORICAL RECORDER #1		06-09-69		
CH 1	TIME GMT IRIG B FORMAT			CH 16	INCO	POS 009
2	FLIGHT OPS DIR	POS 608		17	EECOM	POS 638
3	MISSION DIRECTOR	POS 001		18	GNC	POS 010
4	DOD MANAGER	POS 007		19	RETRO	POS 020
5	OPS AND PRO	POS 004		20	FIDO	POS 017
6	ASST FLIGHT DIR	POS 003		21	GUIDO [L]	POS 018
7	FLIGHT DIRECTOR [L]	POS 609		22	GUIDO [R]	POS 019
8	FLIGHT DIRECTOR [R]	POS 002		23	LOAD CONTROL	POS 825
9	FLT PLANS OFFICER	POS 005		24	RTC	POS 824
10	NETWORK CONTROLLER [L]	POS 602		25	CCATS CMD	POS 823
11	NETWORK CONTROLLER [R]	POS 008		26	TIC	POS 827
12	SURGEON [L]	POS 016		27	CCATS TM	POS 826
13	SURGEON [R]	POS 015		28	TRACK [L]	POS 836
14	CAPCOM [L]	POS 639		29	TRACK [R]	POS 837
15	CAPCOM [R]	POS 014		30	VOICE ANNOTATION	

Pictured is an example of the computer printout of an audio track sheet of a 30-channel Apollo analog tape showing channel information of all tracks.

productions while collaborating on the Apollo digital conversions. Teamwork, he said, and contributions from volunteers and students made the accomplishment possible.

“It was a such a daunting task, so many challenges, so many problems to solve,” Wiseman said, adding that the conversion of the recordings was made possible by the many people “who cared about the preservation of history and finding a way to release this to the public.”

Wiseman commended Hansen for pushing the project forward and using his “brilliant” team of engineers to develop a recording system, process the files, create transcripts, and find funding for the project. Wiseman also recognized the contributions of retiree volunteers, NASA’s Export Control Office, and archivists at the National Archives and Records Administration (NARA) “who went into a deep dark vault and came back with all of these tapes.”

None of the original 30-track audio tapes had been completely digitized before. The first major engineering task was to refurbish the more-than-45-year-old SoundScriber 2-track audio playback system to support 30-track playback. The team had to design, install, and test the new 30-track head that could replay all 30-track audiotape channels simultaneously and set up a 30-channel digitization system pipeline.

Because much of the tape documented the silence between conversations, the team had to develop a system to identify when conversations were beginning and ending, as well as an active-learning system for creating accurate transcripts of the conversations. The team also developed a “hot-spot detection” system to track speaker sentiment, using things such as laughter, to gain insights into behavior and cohesion of the astronauts and support team in Mission Control, in addition to a Web-based, interactive Apollo mission life-cycle interaction module aimed at helping younger users understand the highly technical content of many conversations.

In addition to the 19,000 hours of digitized audio, the team produced corresponding transcripts of every conversation and linked them to the database of digital audio. This process enabled the development of metadata that will help researchers comb through the hours and hours of audio to find the conversations most important to their area of interest of particular projects.

While the processing of the 19,000 hours of tape data from Apollo 11 is a significant accomplishment that will provide greatly improved access to that mission, those hours represent only 25 percent of the audio record for all of Project Apollo. The rest of the material—which still remains to be digitized and



THIS NEW COLLECTION IS A TESTAMENT TO THE MEN AND WOMEN OF NASA, ITS CONTRACTORS, AND SUPPORTERS WORLDWIDE, WHO ALL PLAYED A ROLE IN ONE OF THE MOST IMPORTANT ACHIEVEMENTS IN HUMAN HISTORY.



transcribed—covers the early Apollo test flights in orbit around Earth, the two test missions that sent Apollo 8 around the Moon in December 1968 and put Apollo 10 in orbit around the Moon in May 1969, the five later Apollo missions that landed on the Moon, and the “successful failure” that saw Apollo 13 crippled by an oxygen tank explosion and required Mission Control to use all of the innovation it could muster to bring the crew of three home safely to Earth.

The project’s specific goals included developing new techniques for robust acoustic processing of noisy channels; finding ways to identify when conversations begin in the midst of long sections of silence; accommodating speech-pattern variations; improving transcript quality; developing “sniffing” techniques to automatically characterize the surrounding acoustic environments of Mission Control areas and spacecraft; and developing a new way to identify and track individual speakers by topics and keywords, the speaker’s state of mind, and noise from surrounding environments.

“We have demonstrated the impact of these techniques by creating a novel multi-source and multi-scale event reconstruction system,” Hansen said. “This project brings together the massive multimedia archives of one of the best documented events in all of human history, the Apollo lunar missions, to create experiential interaction with historical materials so rich that they will in some ways exceed what could have been experienced by any participant at the time.”

The NASA team involved in the project included a dozen people in JSC’s External Relations Office, and the team at UT Dallas included a dozen researchers and developers, many of them students and graduate assistants.

This new collection is a testament to the men and women of NASA, its contractors, and supporters worldwide, who all played a role in one of the most important achievements in human history.

So far, most of those people are identified only by the “call signs” for the disciplines they represented in these digitized recordings and transcripts. But this record of their accomplishments and sacrifices as individuals and team members represents a legacy for those who will accomplish similarly great achievements with newer technologies that someday likely will need to be recovered by historians of the future who look back and wonder at how so much was accomplished with what, by today’s standards, was the technological equivalent of stone knives and bearskins.

Learn more about the UT Dallas team’s work on the project at https://www.utdallas.edu/news/2017/12/5-32772_Researchers-Launch-Moon-Mission-Audio-Site_story-sidebar.html.

Learn more about the upcoming 50th anniversary of Apollo and the men and women who made it happen at https://www.nasa.gov/mission_pages/apollolol.

Learn more about NASA’s 60th anniversary and the men and women who have played a role in aeronautics and aerospace advancement at <https://www.nasa.gov/specials/60counting/>.

This article has been edited for this issue of News & Notes. The original version can be found online at <https://go.nasa.gov/2LMSHIS>.

NEWS FROM HEADQUARTERS AND THE CENTERS

NASA HEADQUARTERS

Washington, DC

History Division

By Bill Barry

You might think that summer in Washington, with the heat and humidity, might be a time for taking a slower pace. For the History Division, that couldn't be more wrong. Things have shifted into high gear for the upcoming anniversaries—both the NASA 60th anniversary on 1 October and the Apollo mission 50th anniversaries that will begin 11 days later. We also rescheduled our History Program Annual Review for early August at NASA's White Sands Test Facility (WSTF) near Las Cruces, New Mexico. As usual, we continue to push our various publication projects

through the production process and adapt to the comings and goings of our talented interns. On top of that, we are working closely with the National Air and Space Museum on a December workshop about looking at the Apollo program from the vantage point of 50 years.

While it seemed like we were doing little more than spadework on the upcoming anniversaries for the first half of the year, that preparation proved to be vital in late June. We had a meeting with the new NASA Deputy Chief of Staff, Gabe Sherman, on 20 June to outline our anniversary plans. Halfway through the meeting, Administrator Jim Bridenstine walked in and sat down at the table. It quickly became clear that both the Administrator and his key staff are very interested in NASA history, and they wanted to know what



Attendees of the NASA History Program Annual Review, held 7–9 August 2018, pose in front of an Apollo Command Service Module mockup at the NASA White Sands Test Facility. (Photo credit: NASA/Reed P. Elliott)



NASA Chief Historian Bill Barry shakes hands following a special presentation by Dave Pippen, former chief of the WSTF Laboratories Office from 1975 to 1990, during the History Program Annual Review held 7–9 August 2018. (Photo credit: NASA/Andres Almeida)

resources we needed to implement the plans we have developed. As of the time I'm writing this, the wheels are being put in motion to deliver more (temporary) staff and finances. We are also on the hook to provide regular updates to the Administrator's staff. While there is a huge amount of work ahead of us, the strong support from our new Administrator and his team is very encouraging.

We had a truly outstanding Program Review from 7 to 9 August. The Johnson Space Center (JSC) History Office offered to host the event this year and proposed that we meet at JSC's White Sands Test Facility. What a great idea that was! The folks at White Sands set new standards for hospitality (thanks especially to Antonette Sanchez), and we were able to feature a couple of guest speakers who could speak about local history, both of the region and of the NASA White Sands facility itself. In addition to the usual sharing

of information and mutual consultations, we tried a couple of new things this year, including splinter sessions for historians and archivists, as well as a "film festival" to wrap up our second day of work. The vintage films about the Jet Propulsion Laboratory rocket test launches at White Sands after World War II, a Johnson Space Center quarterly update film for July–September 1968, and NASA's summary film of accomplishments in 1969 took less than an hour but gave the group powerful reminders of the accomplishments of our past. But the Program Review wasn't about fun and good food (though we enjoyed some of both)—we identified *a lot* of work to be done over the next year. One of the key things that we'll focus on is breaking down stovepipes to make partners with other Agency support functions. This won't be easy, but it is clear that it is essential to both us and our potential partners.

Progress on our history publications continues to come in frustrating fits and starts, but your patience with this will soon be rewarded. Our next publication, *Beyond Earth: A Chronicle of Deep Space Exploration, 1958–2018*, by Asif Siddiqi, is going to the printer as I write this and will be in print in September. If the author sounds familiar, you aren't mistaken. Professor Siddiqi wrote a similar volume for us at the turn of the century under the title *Deep Space Chronicle*. This new version updates and improves the material from that earlier volume and fills in the gap of a very busy decade and a half of exploration that has been under way since *Deep Space Chronicle* went to print. I think that you will find *Beyond Earth* an invaluable reference source. Close on the heels of *Beyond Earth* is *The Origins of 21st-Century Space Travel: A History of NASA's Decadal Planning Team and the Vision for Space Exploration, 1999–2004*. This book, by Glen Asner, Deputy Chief Historian in the Office of the Secretary of Defense (and formerly of the NASA History Office), and our own Steve Garber, analyzes the complex and sometimes surprising roots of the new space policy announced by President George W. Bush in the wake of the Columbia accident. This is a must-read for anyone interested in space policy. It should be in print later this fall.



More than 40 WSTF employees joined the NASA History Program Annual Review to hear from Dale Owen, a former rancher whose land was bought by the U.S. Government in the early 1960s for the creation of WSTF. (Photo credit: NASA/Andres Almeida)

Plans for the Apollo Dialogues Workshop jelled over the summer (thanks to some incredible support from Valerie Neal and her colleagues at the National Air and Space Museum). The application deadline to participate in this event on 7 December at the Smithsonian's Ripley Center in Washington, DC, passed at the end of August. The planning team (which also includes Steve Garber and me at Headquarters and Brian Odom at Marshall Space Flight Center) will build the schedule of panels and speakers this fall. You'll see that when it comes together on the Workshop Web site at <https://history.nasa.gov/Apollo50thworkshop/>. If you aren't able to participate this year, don't worry. The expectation is that this workshop will kick off a number of new research projects looking at the legacy of Apollo after half a century from new points of view. Keep your eyes open for a followup conference late in 2019 aimed at getting these new projects (and others, we hope) into print.

Finally, I can't finish off this report without singing the praises of the History Division staff. Our outstanding Program Review was a team effort by our hosts at White Sands, the JSC History Office (John Uri, Jennifer Ross-Nazzal, and Sandra Johnson), and the Headquarters team—especially the essential Nadine Andreassen and (thank goodness he's back) Andres Almeida. I am also convinced that much of the positive energy buzzing around the Program Review was generated by our dynamic new Chief Archivist, Robyn Rodgers. We

have, as always, been lucky to have some short-term members of the family this summer, our interns Kate Wall and Savannah Jelks. They both will have started their junior years (at St. John's College in Maryland and Union College in New York, respectively) by the time you read this, but you will see some of their work in this newsletter and in so many other of our accomplishments of the last several months. Our fall interns will be Rachel Carollo, a senior at the University

of Colorado in Boulder, and Will McCormick, a grad student at Oklahoma State University. We are so lucky to have such energetic, talented, and dedicated interns. They inspire me every day—and I'm sure you enjoy the fruits of their labors as well.

AMES RESEARCH CENTER (ARC)

Moffett Field, California

Archives Update

by April Gage

Senior scientist Richard Mains supported the archives this quarter by lending his substantial subject area expertise in the Center's long-term involvement in space life sciences research programs involving investigations in the areas of plant biology, microbiology, immunology, muscle and skeletal systems, and cardiovascular systems. Richard led efforts to analyze and contextualize nearly 70 cubic feet of material, the bulk of which relates to joint U.S.–Soviet/Russian biological satellite programs (Cosmos/Bion and Foton), which began in the early 1970s and continue today. Among his completed tasks, he documented Ames contributions to space life sciences from 1965 to the present and produced a lengthy history of the U.S.–Soviet/Russian biological satellite program, along with biographies of key project managers and biographical sketches of over 50 project personnel



IN JUNE 1940, GEORGE LEWIS SUCCESSFULLY CONVINCED CONGRESS TO APPROVE APPROPRIATIONS FOR THE ESTABLISHMENT OF A THIRD NACA RESEARCH LABORATORY DEDICATED SOLELY TO THE ADVANCEMENT OF AIRCRAFT ENGINE RESEARCH.



from both countries. This information will increase understanding of the program and the usability of the material, and it will be incorporated into the guides for a Biological Satellite Collection and the Biological Satellite Oral History Description Project series in the Histories of Ames Research Files Collection. Once completed, these guides will be published on the Online Archive of California and the Ames History Archives Web site at <https://oac.cdlib.org>.

In other activities, April Gage and Danielle K. Lopez, with assistance from scientist Edina Blazevic-Levic, completed the final phases of two backlogged audiovisual materials digitization projects. They finished authoring descriptive metadata records for 187 moving-image and audio recordings, including 27,200 feet of 16-millimeter film footage. In addition, they chemically tested all of the 16-millimeter film to quantify the severity of deterioration. Danielle and April also moved forward with a new audiovisual materials digitization project. As part of the collections review and selection process, they teamed up with subject experts Allan Meyer and Edwin Erickson to review 21 cubic feet of in-flight video footage from the Kuiper Airborne Observatory. They identified a sample set of the most historically significant material to reformat. In total, 143 moving-image and audio recordings representing various subjects were digitized. The next phases will involve return inspection,

quality assurance review, and creation of descriptive metadata records.

The History Archives moved into the Center Operations, Logistics and Documentation Division under the management of Darlene Gross this quarter. April is assuming the additional role of Center Artifacts Manager.

GLENN RESEARCH CENTER (GRC)

Cleveland, Ohio

By Bob Arrighi

This 28 September marks the 70th anniversary of the renaming of the National Advisory Committee for Aeronautics's (NACA) Flight Propulsion Research Laboratory to the NACA Lewis Flight Propulsion Laboratory in honor of George W. Lewis, the NACA's first Director of Aeronautical Research. It was under his leadership that the NACA grew from a young agency of 43 staff with a modest laboratory in Hampton, Virginia, to a widely respected organization advancing state-of-the-art aeronautical research.

The origins of the Cleveland lab (now NASA Glenn Research Center) can be traced directly to Lewis. During a trip to Germany in the late 1930s to observe their government-sponsored aeronautical research activities, he concluded that the current efforts of the NACA were inadequate to compete. The lack of significant research on aircraft engines was a particular national security concern. Lewis was a strong advocate of rectifying the disparity. In June 1940, George Lewis successfully convinced Congress to approve appropriations for the establishment of a third NACA research laboratory dedicated solely to the advancement of aircraft engine research. Ground was broken for the NASA Aircraft Engine Research Laboratory in Cleveland, Ohio, in January 1941.

Lewis was a frequent visitor to the lab during the war years (weekly during construction), and he exhibited a great deal of personal commitment to ensuring the success of the NACA's work in order to ensure victory.



Pictured is George W. Lewis, Director of Aeronautical Research.

When the war was won, he was keen to return the lab to its original intent of pushing the boundaries of new engine technology. He encouraged and promoted expansion into new areas of research, such as jet engines and high-speed flight. Declining health forced him to resign his post as Director of Aeronautical Research in 1947, but due to his unparalleled knowledge, he retained a consulting role. The immense stress he took on during the war had taken its toll, though—he died on 12 July 1948, less than a year after his resignation. George Lewis spent the entirety of his professional career with the NACA and was universally recognized an adept leader, a skilled engineer, and gracious to

all he met. He was awarded the prestigious Guggenheim Medal in 1936 and was elected to the National Academy of Sciences in 1945.

According to Center records, a resolution to rename the laboratory in his honor was approved by the NACA Main Committee within days of his death. A short ceremony marking the official renaming was held to coincide with the annual inspection in September. A bronze plaque bearing his likeness was unveiled following a brief eulogy. Two of his sons, Harvey Lewis and George Lewis, Jr., went on to work at the Center bearing his name.

The renaming of the lab in honor of George Lewis was the second name change for the Center. When the NACA was absorbed into the new space agency, it was renamed a third time to “NASA Lewis Research Center.” In 1999, the Center was renamed yet again to “NASA John Glenn Research Center at Lewis Field.”

GODDARD SPACE FLIGHT CENTER (GSFC)

[Greenbelt, Maryland](#)

By Holly McIntyre

Here in Greenbelt, Maryland, at Goddard Space Flight Center, we’ve been so busy building our own Center archives from scratch that we haven’t even taken the time to introduce ourselves or our program to the space history community! The Goddard Space Flight Center is swiftly approaching its 60th anniversary, and,

while our Center has decades of advancements and contributions in the fields of engineering, technology, and science to celebrate, we're a little embarrassed to say that we haven't had an archive on Center to capture our rich legacy...until now.

The NASA Goddard Archives preserve and provide access to historically, culturally, and technologically significant material relating to Goddard Space Flight Center in order to ensure that the scientific exploration, innovative practices, and technological advancements of our generations of Goddardites are not lost to time.

Meet Our Team



Holly McIntyre is the Center Archivist for Goddard Space Flight Center. She has a master of library science with a specialization in archives from the University of Maryland's iSchool. Before coming to NASA, Holly worked at the National Archives and Records

Administration as both a conservator technician and an archivist.

At Goddard, Holly is busy building the Archives' collection through appraisal and accessioning tasks. She also leads the team in processing, digitizing, and digital preservation initiatives. She has 11 years of federal archival experience.



Christine Stevens is an Archives Pathways Intern at Goddard Space Flight Center. She graduated from the University of Delaware with a bachelor of arts in history and is currently pursuing her master of library and information science

through the University of Alabama Online. Christine helps to appraise, process, and digitize records at the Goddard Archives.



Jess Deibert is a current Archives Pathways Intern at Goddard. She received her bachelor of arts in English from Susquehanna University and is a current master of library and information science student at the University of Maryland, set to graduate in December 2018.

Currently, she is working on processing a collection of donated material from William "Bill" Isley, an early Goddard engineer.

Our team is in the midst of several large projects that span a variety of archival functions. We are excited to share our progress with you so stay tuned!

JOHNSON SPACE CENTER (JSC)

[Houston, Texas](#)

By John Uri

The JSC History Office resumed planning for the resurrected NASA History Program Annual Review, which was held 7–9 August 2018 at the NASA White Sands Test Facility near Las Cruces, New Mexico. Our hosts at White Sands were as happy and eager to host us as we were to visit their facility, and we thank them for all their efforts in planning for the meeting and ensuring its success.

We continue to expand our extensive oral history collection. With the change of Center leadership at JSC, we completed interviews with outgoing Center Director Ellen Ochoa just days before her retirement and with new Center Director Mark Geyer within a month of his assuming the position. There are plans to follow up with regular interviews in the coming

years. Historians Sandra Johnson and Jennifer Ross-Nazzal traveled to Huntsville, Alabama, to interview former NASA Acting Administrator Robert Lightfoot, and a followup interview was conducted in July. We are also conducting a series of interviews with members of the team who performed the cryogenic thermal vacuum testing of the James Webb Space Telescope here at JSC in 2017. An interview was conducted in July with former Langley Research Center Director and former NASA Acting Deputy Administrator Lesa Roe, who is now Chancellor of the University of North Texas system. The transcripts of the interviews will be uploaded to the JSC History Portal once the subjects have approved them for release.

In a contribution to recognizing upcoming anniversaries of significant space events, the JSC History Office is working with the JSC External Relations Office (ERO) on a continuing series of articles posted on www.nasa.gov and JSC's Facebook and Twitter accounts. Abstracts of the articles appear online in JSC's newsletter *Roundup Today*. The articles highlight the anniversaries of less-celebrated events and people who were nevertheless crucial to achieving the Moon landing within President Kennedy's timetable. We sincerely thank our colleagues at Ames, Armstrong, the Jet Propulsion Laboratory (JPL), Kennedy, Marshall, and Stennis, who have all contributed in significant ways to these articles. The May issue of Stennis Space Center's newsletter, *Lagniappe*, included an article jointly authored by JSC, Marshall Space Flight Center, and Stennis Space Center regarding modifications and testing of the Saturn V after the Apollo 6 flight to clear the rocket for its first crewed mission. Working with ERO management, the History Office authored special articles for Black History Month, Women's History Month, and Asian Pacific Islander Heritage Month.



WE ARE ALSO CONDUCTING A SERIES OF INTERVIEWS WITH MEMBERS OF THE TEAM WHO PERFORMED THE CRYOGENIC THERMAL VACUUM TESTING OF THE JAMES WEBB SPACE TELESCOPE HERE AT JSC IN 2017.

The JSC History Office continues its effort to publish Jennifer Ross-Nazzal's book *Making Space for Women*, in collaboration with the JSC University Research, Collaboration and Partnership Office. The manuscript is currently undergoing peer review at Texas A&M University Press.

In June, Jennifer Ross-Nazzal supported a meeting at the University of Houston–Clear Lake (UHCL) organized by JSC Archivist Mark Scroggins. A visiting delegation of the Japan Library Fair and Forum Organizing Committee, an affiliate of the American Library Association, requested a tour of the UHCL Library and information about the JSC History Collection held there. Jennifer provided an overview of the ties between UHCL and JSC.

The History Office team is working with Safety and Mission Assurance IT and Knowledge Management Office specialists to relocate the History Office Portal to a more convenient server. Concurrently, spring and summer interns have been upgrading the look and feel of the Portal. These changes will provide the History Office with greater control over content updates to the site and a more modern look to the site. We hope to complete the revamp of the portal and release a new look soon.

MARSHALL SPACE FLIGHT CENTER (MSFC)

Huntsville, Alabama

By Brian Odum

The Marshall history office has been busy over the past quarter preparing for the celebration of NASA's 60th anniversary and working on several other important products. On 16 June, the office participated in the



A delegation of the Japan Library Fair and Forum Organizing Committee visits the Neumann Library at the University of Houston–Clear Lake.

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“NASA in the Park” event in downtown Huntsville. The event included several exhibits and information booths highlighting the work currently underway at NASA as well as over the past decades. Over 6,000 visitors attended the event. During this past quarter, Marshall Historian Brian Odom attended the Alabama Bicentennial Teacher Summer Institute, where he spoke on MSFC’s role in the Civil Rights Movement. The lecture was part of that program’s “Alabama Goes to Space” sessions.



Billie Robertson discusses her career at Marshall during the Saturn Program during a recent oral history interview.



Charlie Cooper stands in front of the original prototype of the Neutral Buoyancy Simulator at Marshall Space Flight Center in 1967.

An initiative is now under way in the office to digitize a large number of audio recordings from the Apollo-Saturn era, including several speeches by Dr. Wernher von Braun, a Summer Lecture Series from 1964, and Saturn Program reviews. A related recent project involved uploading several recently digitized 16-millimeter films to MSFC's YouTube channel. These films include the majority of the Quarterly Saturn Film Reports, President Eisenhower's dedication of the Center in September 1960, and films from numerous other projects from the Saturn rocket to the Hubble Space Telescope. A related project involves the digitization of 70-millimeter footage from the launches of several Apollo missions. Currently, the office is recording a series of video interviews with Marshall retirees intended to capture personal

memories of Marshall during the Apollo program. One recent interview was with Billie Robertson, who started her career as a mathematician with the Army in 1952.

Over the course of the last several months, Jordan Whetstone in the Marshall Archives has been working primarily on transcribing a series of interviews conducted with several Marshall retirees who began their careers with the Army Ballistic Missile Agency before transferring to NASA in 1960. All aspects of the launch vehicle are covered, from development to the emotions felt following the launch of Apollo 11 and the return of astronauts from the Moon. Important topics discussed include technical challenges confronted during the Saturn program, relationships formed between

contractor and civil service teams, and what it was like to be a part of such a monumental mission. These interviews, once fully transcribed and edited, will be made available on the NASA Marshall History Office Web page at <https://history.msfc.nasa.gov>.

The Marshall History Office is also hosting one intern this summer, Jessica Brodt. Jessica is a Ph.D. student at the University of Alabama and is currently researching the history of Marshall's Neutral Buoyancy Simulator (NBS), the 75-foot-diameter, 40-foot-deep water tank and now National Historic Landmark utilized by NASA from 1968 to 1997 to assist engineers in developing hardware for missions including Skylab, Hubble, and the International Space Station. Jessica's research will support a future history of the NBS facility. Jessica is also assisting with several anniversary-related activities at the Center.

STENNIS SPACE CENTER (SSC)

Stennis Space Center, Mississippi

By Jessica Herr

On 4 October 1957, the Soviet Union launched Sputnik into low-Earth orbit. Four years later, they put the first human in space, Yuri Gagarin. The United States had its eye on the big prize, though. The United States was going to the Moon.

The space race morphed into the Moon race, and the then-Mississippi Test Facility was a very important factor in the United States' reaching the Moon. NASA needed a place to test the large rocket engines and stages needed to carry humans to the Moon.

In August 1961, an ad hoc committee of members from NASA Headquarters and Marshall Space Flight



Pictured is the first site test at the Mississippi Test Facility.

Center began the work of finding a suitable location for a new facility. There were several variables to consider since the rockets would be assembled at the Michoud Assembly Facility outside of New Orleans, Louisiana, and launched from Cape Canaveral, Florida. Ideally, NASA needed a facility that would lie between these two places, be away from a densely populated area because of the noise associated with testing rocket engines, have access to both waterway and highway, have a mild climate so testing could conceivably be done year-round, and have supporting communities nearby.

Several already-existing facilities were in the running, but the committee kept coming back to a marshy, pine tree-covered area along the Pearl River in Mississippi. The Pearl River site was the winner.

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On 25 October 1961, NASA announced that a rocket engine test site would be established in Hancock County, Mississippi. The site, then known as Mississippi Test Operations, would test the Saturn rockets that would launch the Apollo missions to the Moon. Construction would begin as soon as possible.

Just five years later, on the misty morning of 23 April 1966, there was a loud cracking sound and a large flame lit up the A-2 Test Stand for the first

time. Hard work done all night led to ignition of the Saturn V second-stage rocket engines.

The test lasted for 15 seconds. Less than a month later, a full-duration static firing of the Saturn V stage was conducted. The Apollo program was gearing up for human lunar missions. The space race was on, and the United States had just pulled ahead.

OTHER AEROSPACE HISTORY NEWS

CALL FOR PARTICIPANTS

Apollo Dialogues Workshop: New Perspectives on Spaceflight in Society

Convening Friday, 7 December 2018, 8:30 a.m.–5 p.m. at the Smithsonian Institution Ripley Center on the National Mall in Washington, DC.

The 50th anniversary of the Apollo 11 landing on the Moon offers an opportunity to reflect on what

we know about the Apollo era and its legacies, what we still need to learn, and how we may best record and interpret the significance of spaceflight in society today and into the future. We invite colleagues whose research and writing extend our understanding of Apollo, the Apollo era, human spaceflight, future space, and related areas to join together in assessing the current state of the field, suggesting new lenses for analysis and interpretation, and considering new paths for future scholarship.

We seek to engage 50 to 100 participants representing

- a mix of senior, mid-career, and emerging scholars and writers;
- participants within and beyond the disciplines of space history and the history of science and technology, including other fields in the social sciences and humanities; and
- journalists, writers, and other non-Ph.D. historians who present history in well-researched forms in the print and broadcast media, documentary and feature films, popular literature, and the arts.

We plan to make travel grants up to \$500 to graduate students and others with demonstrable need.

We also hope to catalyze new research leading to a second workshop in late 2019 and resulting in a publication before the Apollo 17 anniversary in 2022.

Please share this announcement with others who might be interested. Updates and an agenda will be posted online at <https://history.nasa.gov/Apollo50thworkshop/>.

2018 FELLOWSHIP IN AEROSPACE HISTORY RECIPIENTS ANNOUNCED

The 2018 Fellowships in Aerospace History, supported by NASA, have been awarded to Lisa Ruth Rand, Ingrid Ockert, and Rebecca Perry. Rand is working on her first book, titled *Space Junk: A History of Waste in Orbit*. Invoking the history of science, politics, and archaeology, Rand argues that the rise in popular awareness of space junk at the beginning of the Space Age paralleled and informed the ascent of mainstream environmentalism.

The History of Science Society has awarded the 2018–19 fellowship to Ingrid Ockert of Princeton University. Ockert will dive deeper into her dissertation, titled *The Scientific Storytellers: How Scientists, Journalists, and Actors Brought Science onto American Television, 1948–1980*, exploring the behind-the-screen connections between television specialists, museum professionals, educators, and scientific experts.

The Society for the History of Technology has awarded the 2018–19 fellowship to Rebecca Perry of the University of Virginia. Perry's research will explore the origins and work of the Jet Propulsion Laboratory's (JPL) Computer Graphics Laboratory (CGL), in addition to the men and women who created computer-generated images and films for the Voyager missions and Carl Sagan's *Cosmos* television series, as well as other influential scientific visualization projects from 1977 to 1990. The work will culminate in a publication titled *Filming the Future: Planetary Voyages and Computer Graphics at NASA/JPL*.

The fellowships are open to applicants who already hold a doctoral degree in history or a closely related field, as well as those who have completed all course work for a doctoral degree-granting program. Preference is given to scholars in early stages of their careers. NASA provides funds to the American Historical Association, the History of Science Society (HSS), and the Society for the History of Technology (SHOT) to allow each association to award a fellowship.

Congratulations to all recipients.

For more information on how to apply, visit <https://www.nasa.gov/content/nasa-history-office-fellowships>.

RECENT PUBLICATIONS

Compiled by Chris Gamble

The Saturn System Through the Eyes of Cassini, by NASA (12th Media Services, March 2018). Over a period of 13 years, the Cassini spacecraft captured about 450,000 spectacular images within the Saturn system, providing new views of the “lord of the rings” and a plethora of iconic images. To honor the art and science of Cassini, this book was developed collaboratively by a team from NASA’s Planetary Science Division (PSD), NASA’s Jet Propulsion Laboratory (JPL), and the Lunar and Planetary Institute (LPI). While these images represent the tip of the iceberg—each telling a story about Saturn and its mysterious moons—our hope is that the mission will inspire future artists and explorers. The sheer beauty of these images is surpassed only by the science and discoveries they represent.

Locomotive to Aeromotive: Octave Chanute and the Transportation Revolution, by Simine Short (University of Illinois Press, 2013). Aviation researcher and historian Simine Short brings to light many previously overlooked facets of Chanute’s professional and personal life. In the late 19th century, relatively few people considered engineering as a profession on par with law or medicine, but Chanute devoted much time and energy to the newly established professional societies that were created to set standards and serve the needs of civil engineers. Though best known for his aviation work, he became a key figure in the opening of the American continent by laying railroad tracks and building bridges, experiences that later gave him the engineering knowledge to build the first stable aircraft structure.

Gemini Flies—Unmanned Missions and the First Manned Mission, by Dave Shayler (Springer-Praxis, March 2018). This book introduces the crucial three-step test program employed by Project Gemini, covering the short uncrewed orbital flight of Gemini I that tested the compatibility of the launch vehicle, spacecraft, and ground systems; the uncrewed suborbital flight of Gemini II to establish the integrity of the

reentry system and protective heat shield; and finally the three-orbit crewed evaluation flight of Gemini III, christened Molly Brown by her crew. The book recalls that third mission orbit by orbit, using mission transcripts, postflight reports, and the astronauts’ own account of their historic journey.

Space Radiation and Astronaut Safety (SpringerBriefs in Space Development), by Erik Seedhouse (Springer, April 2018). This brief explores the biological effects of long-term radiation on astronauts in deep space. The text concisely addresses the full spectrum of biomedical consequences from exposure to space radiation and goes on to present possible ways to mitigate such dangers and protect astronauts within the limitations of existing technologies.

Foreword to Spaceflight, by Michael L. Ciancone (Apogee Books, April 2018). This book provides a long-anticipated update to the author’s acclaimed book *The Literary Legacy of the Space Age*. This update offers a 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. Most 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) has provided a unique annex of Russian titles published in the former USSR.

Antarctica: Earth’s Own Ice World, by Michael Carroll and Rosaly Lopes (Springer-Praxis, May 2018). In 2016, scientist Rosaly Lopes and artist Michael Carroll teamed up as fellows of the National Science Foundation to travel to Mount Erebus, the world’s southernmost active volcano, in Antarctica. The logistics of getting there and complex operations of Antarctica’s McMurdo Station echo the kinds of

strategies that future explorers will undertake as they set up settlements on Mars and beyond. The bulk of this story delves into Antarctica's infrastructure, exploration, and remote camps, culminating on the summit of Erebus. There, the authors explored the caves and ice towers on the volcano's flanks, taking photographs and generating original art depicting scenes in Antarctica and terrestrial analogs on other planets and moons.

Chasing New Horizons: Inside Humankind's First Mission to Pluto, by Alan Stern and David Grinspoon (Picador, May 2018). *Chasing New Horizons* is the story of the men and women behind the New Horizons mission to Pluto. Told from Dr. Alan Stern's insider's perspective as the mission's principal investigator, this book is a riveting story of scientific discovery and of how far humanity can go when people focused on a dream work together toward their incredible goal.

Everything You Know About Space Is Wrong, by Matt Brown (Batsford, May 2018). In this book, Matt Brown brings you a compendium of facts about our planet, the universe, and everything in between. Thanks to popular sci-fi films and TV shows, there have been many misconceptions about the cosmos—from traveling through wormholes to blowing up asteroids. In *Everything You Know About Space Is Wrong*, the reader will find a plethora of myths, legends, and misquotes that have shaped the way we view the universe today.

Into the Extreme: U.S. Environmental Systems and Politics Beyond Earth, by Valerie Olson (University of Minnesota Press, May 2018). *Into the Extreme* is the first book-length, in-depth ethnography of U.S. human spaceflight. This book discusses how outer space contributes to the scope and scale of today's natural and social environments. With access to spaceflight worksites ranging from astronaut training programs to life science labs, Valerie Olson examines how U.S. experts work within the solar system as the container of life and as a vast site for new forms of technical and political environmental control.

Stennis Space Center (Images of America), by Cindy Donze Manto (Arcadia Publishing, May

2018). Originally known simply as Mississippi Field Operations, Stennis Space Center arose from the dissolution of two towns and several surrounding communities that had served the lumber industry since the 1800s. Its sole purpose was to static-test the free world's most powerful rockets after they arrived by barge via the Pearl River. Spurred on by an intense Cold War race to the Moon, NASA battled mud, mosquitoes, and snakes as it cleared the way for its colossal test stands for the Apollo program. When completed, the A and B Test Complexes towered between 200 and 400 feet high, the tallest structures in the state of Mississippi in 1965. Dr. Wernher von Braun, the first Director of Marshall Space Flight Center, was fond of saying that "to get to the Moon, we will have to go through Mississippi to get there!" Today, Stennis Space Center is NASA's largest propulsion test complex and also home to a diverse collection of resident agencies: federal, military, private, local, national, and international.

Above and Beyond: Exploring the Business of Space, by Louis Brennan, Loizos Heracleous, and Alessandra Vecchi (Routledge, May 2018). This book provides an overview of the business of space and its distinctive competitive dynamics. The book explores the commercialization of space, taking the reader on a journey from the era of the space race up to the present and beyond.

The Moon (Kosmos), by Bill Leatherbarrow (Reaktion Books, May 2018). Drawing on many years of practical observation, the author provides an insight into the history and evolution of this enthralling astronomical body. He describes how and why the study of the Moon has evolved, particularly in the age of the telescope, and offers an overview of developments in lunar science since the advent of the Space Age. The author also provides advice on how to make your own observations of the Moon.

Satellite-Based Earth Observation: Trends and Challenges for Economy and Society, edited by Christian Brünner, Anita Rinner, Georg Königsberger, and Hannes Mayer (Springer, May 2018). This book focuses on the topic of trends and challenges with regards to satellite-based Earth observation. Speakers

include legal experts in the field and representatives from institutions such as the European Space Agency, the European Space Policy Institute, academia, and the private sector.

The Sun: Images from Space, edited by Amherst Media (Amherst Media, May 2018). *The Sun: Images from Space* contains extraordinary beauty, with over 130 incredible, detailed images of our Sun taken from space. These images come from Solar Dynamics Observatory (SDO) Mission instruments in conjunction with other various instruments. Taken from space, these images were assembled using data collected by NASA and its partners, showing our Sun as it has not before been revealed to us here on Earth, 93 million miles away. See the coronal mass ejections, electric currents, magnetic fields, the solar wind, the photosphere, the chromosphere, the corona, and the hot plasma soup.

Life on Mars: What To Know Before We Go, by David A. Weintraub (Princeton University Press, May 2018). This book tells the story of the quest to answer one of the most tantalizing questions in astronomy: does life exist on Mars? The author tells why, of all the celestial bodies in our solar system, Mars has beckoned to us the most. He traces how our ideas about life on Mars have been refined by landers and rovers, terrestrial and Mars-orbiting telescopes, spectroscopy, and even a Martian meteorite.

Astrobiology, Discovery, and Societal Impact (Cambridge Astrobiology), by Steven J. Dick (Cambridge University Press, May 2018). New discoveries in astrobiology, including thousands of planets around distant stars, have increased the likelihood of finding life beyond Earth. Astronomer and historian Steven J. Dick examines the philosophical, theological, and societal implications of such a discovery. He presents the remarkable and often surprising results in easily accessible language.

Lockheed SR-71 Blackbird: The Illustrated History of America's Legendary Mach 3 Spy Plane, by James C. Goodall (Schiffer Military History, May 2018). The legendary SR-71 Blackbird spy plane was, and still

is, the world's only operational Mach 3 aircraft. It was designed, built, and tested by Lockheed's famed "Skunk Works." This new book covers all 50 Blackbirds built, from the first flight in 1962 to the last in 1999.

A Galaxy of Her Own: Amazing Stories of Women in Space, by Libby Jackson (Harper Design, June 2018). Filled with beautiful full-color illustrations, this groundbreaking compendium honors the amazing true stories of 50 inspirational women who helped fuel some of the greatest achievements in space exploration from the 19th century to today—including human "computers" Mary Jackson and Katherine Johnson, as well as former NASA Chief Astronaut Peggy Whitson, the record-holding American biochemistry researcher who has spent the most cumulative time in space.

Light of the Stars: Alien Worlds and the Fate of the Earth, by Adam Frank (W. W. Norton & Company, June 2018). Astrophysicist Adam Frank traces the question of alien life and intelligence from the ancient Greeks to the leading thinkers of our own time. He shows how we as a civilization can only hope to survive climate change if we recognize what science has recently discovered: that we are just one of 10 billion trillion planets in the universe, and it is highly likely that many of those other planets host or have hosted technologically advanced alien civilizations. Moreover, according to Frank, each of those civilizations must have faced the same challenge of civilization-driven climate change. The book poses what may be the largest question of all: What can the likely presence of life on other worlds tell us about our own fate?

Mars Owners' Workshop Manual: From 4.5 Billion Years Ago to the Present (Haynes Manuals), by David M. Harland (Haynes Publishing U.K., June 2018). From early telescopic observations, through the dawn of the Space Age, to today's quest for life on Mars, this book explains the history of humanity's study and analysis of the planet using orbiters, landers, and rovers, as well as following the discovery of water ice below the planet's surface. Harland also explores how modern-day science has furthered our understanding of Mars.

Catching Stardust: Comets, Asteroids and the Birth of the Solar System, by Natalie Starkey (Bloomsbury Sigma, June 2018). Icy, rocky, sometimes dusty and still mysterious comets and asteroids are among the solar system's very oldest inhabitants, formed within a swirling cloud of gas and dust in the area of space that eventually hosted the Sun and its planets. This book tells the story of these enigmatic celestial objects, revealing how scientists are using them to help understand a crucial time in our history: the birth of the solar system and everything contained within it.

Frontiers of Space Risk: Natural Cosmic Hazards & Societal Challenges, edited by Richard Wilman and Christopher J. Newman (CRC Press, June 2018). This book brings together diverse perspectives on current and emerging themes in space risk, covering both the threats to Earth-based activities arising from space events (natural and humanmade) and those inherent in space activity itself. Drawing on the latest research, the opening chapters explore the dangers from asteroids and comets, the impact of space weather on critical technological infrastructure on the ground and in space, and the more uncertain threats posed by rare hazards farther afield in the Milky Way.

Earth View: Extraordinary Images from the Landsat NASA/USGS Satellites, by Tim Dedopulos (Carlton Books Ltd., June 2018). Using over 200 high-definition satellite images from NASA's Landsat satellite program, this book takes the reader on a journey of discovery around the globe, revealing in stunning detail the extraordinary geological features, humanmade structures, and natural wonders that can only be viewed from above. Reaching across all continents and including the most remote glaciers, volcanic fields, shifting sands, and frozen wastelands, it inspires a fresh perspective of our world.

The Earth: NASA Images from Space, edited by Amherst Media (Amherst Media, July 2018). This collection includes over 180 images compiled from instrument data of NASA and their world-class collaborators. Some of these instruments are sensitive to the visual range of the electromagnetic spectrum. Other instruments record other wavelengths, such

as ultraviolet and infrared. Colors are assigned to portions of data. Details of Earth from above show forest fires, floods, hurricanes, parks, cloud formations, the great cities of the world, sleepy backwaters, reefs, oceans, glaciers, snow-capped mountains, archaeological sites, and transportation highways.

From Habitability to Life on Mars, edited by Nathalie A. Cabrol and Edmond A. Grin (Elsevier, July 2018). Throughout the book, the authors show how the investigation of terrestrial analogs to early Martian habitats under various climates and environmental extremes provides critical clues to understanding where and how to search for biosignatures on Mars. The authors present an introduction to the newest developments and state-of-the-art remote and in situ detection strategies and technologies that are being currently developed to support the upcoming ExoMars and Mars 2020 missions.

It's a Question of Space: An Ordinary Astronaut's Answers to Sometimes Extraordinary Questions, by Clayton C. Anderson (University of Nebraska Press, July 2018). Having spent over 150 days on his first tour of the International Space Station, retired astronaut Clayton C. Anderson has fielded thousands of questions over the years about spaceflight, living in space, and what it is like to be an astronaut. This book gathers Anderson's answers to these questions and more.

Russia's Posture in Space: Prospects for Europe (SpringerBriefs in Applied Sciences and Technology), by Marco Aliberti and Ksenia Lisitsyna (Springer, July 2018). This book discusses the evolution of Russian space activities with a focus on their international cooperation strategy. This analysis is carried out in relation to the evolution of the domestic and international dynamics that have been impacting the country's direction in space, with the ultimate goal of providing an assessment of their impact on current and foreseeable Europe-Russia space relations.

European Access to Space: Business and Policy Perspectives on Micro Launchers (SpringerBriefs in Applied Sciences and Technology), by Matteo Tugnoli,

Martin Sarret, and Marco Aliberti (Springer, July 2018). This book provides an analysis of the dynamics of the global launch service market associated with small satellites by placing a particular focus on its unfolding trends and future outlook. From an economic perspective, the emergence of numerous micro-launcher initiatives on top of already-existing launch solutions for small satellites raises questions about the specific nature and size of the small-satellite market that will—or could—be addressed by these emerging launch services offerings.

Honest Vision: The Donald Douglas Story: Timeless Leadership Lessons from an Engineering Mind and Aviation Icon, by Julie Boatman Filucci (Aviation Supplies and Academics, Inc., July 2018). Through this book, the author explores the life of Donald Wills Douglas, founder of the Douglas Aircraft Company, a genius innovator and engineer. What inspired Douglas to envision a commercial airliner when aviation was in its infancy? What key elements to his leadership style led Douglas Aircraft Company to success? What secret came to light that likely contributed to the downward spiral of that same business? The book brings into focus a facet of a momentous time in world history, illuminated by one man's drive to make the skies available to all.

India China Space Capabilities: A Comparison, by Sanjay Kumar (Vij Books India, August 2018). This book brings out the key features of China's space program, its future trajectory, and how it can impact India's national interest. It further suggests options for India on how the nation can secure its geopolitical economic interests and security concerns without getting into a space race with China.

Apollo Mission Control: The Making of a National Historic Landmark, by Manfred von Ehrenfried (Springer-Praxis, August 2018). This book describes the history of this now-iconic room that represents America's space program during the Gemini, Apollo, Skylab, Apollo-Soyuz, and early Space Shuttle eras. It is now a National Historic Landmark and is being restored to a level that represents the day the

flight control teams walked out after the last lunar landing missions.

The Journey to Moonwalking: The People Who Enabled Footprints on the Moon, by Kenneth Thomas (Curtis Press, October 2017). This is the story of human efforts, specifically the innovation, struggle, and sacrifice carried out by otherwise ordinary men and women, that culminated in the spacesuit that made the first human surface explorations of the Moon possible.

Space Safety and Human Performance, edited by Barbara Kanki, Jean-Francois Clervoy, and Gro Sandal (Butterworth-Heinemann, November 2017). During spaceflight, human performance can be deeply affected by physical, psychological, and psychosocial stressors. Endorsed by the International Association for the Advancement of Space Safety (IAASS) and drawing on the expertise of the world's leading experts in the field, this book is primarily centered on humans on board spacecraft but also covers operators of control centers on the ground and behavioral aspects of complex organizations, thus addressing the broad spectrum of space actors.

Spaceport Earth: Legendary Launch Pads, Long-Shot Upstarts, and the Remaking of American Spaceflight, by Joe Pappalardo (The Overlook Press, November 2017). Aerospace journalist Joe Pappalardo has witnessed rocket launches around the world, visiting every working spaceport in the United States. In his book *Spaceport Earth*, Pappalardo describes the rise of a plethora of private companies in the United States and how they are reshaping the way the world is using space for industry and science—and creating spaceports.

Apollo Program Development Plan, edited by Robert Godwin (Collector's Guide Publishing, November 2017). This book describes President John F. Kennedy's plan to land humans on the Moon as the plan was summarized for a very limited number of people who were highly placed in the organizational structure.

The Planets: Photographs from the Archives of NASA, by Nirmala Nataraj (Chronicle Books, November 2017). This volume offers a rich visual tour of the planets in our solar system. More than 200 photographs from the archives of NASA are paired with extended captions detailing the science behind some of our cosmic neighborhood's most extraordinary phenomena.

Unveiling Galaxies: The Role of Images in Astronomical Discovery, by Jean-René Roy (Cambridge University Press, November 2017). In this book, the journey of understanding galaxies is told through the lens of the evolving use of images as investigative tools. Initial chapters explore how early insights developed in line with new methods of scientific imaging, particularly photography. The volume then explores the impact of optical, radio, and x-ray imaging techniques. The final part of the story discusses the importance of atlases of galaxies: how astronomers organized images in ways that educated people, promoted ideas, and pushed for new knowledge. By examining developments in imaging, this text places the study of galaxies in its broader historical context, contributing to both astronomy and the history of science.

Picturing the Cosmos: A Visual History of Early Soviet Space Endeavour, by Iina Kohonen (Intellect Ltd., December 2017). Space is the ultimate canvas for the imagination, and in the 1950s and '60s, as part of the space race with the United States, the solar system was the blank page upon which the Soviet Union etched a narrative of exploration and conquest. In this book, drawing on a comprehensive corpus of rarely seen photographs and other visual phenomena, the author maps the complex relationship between visual propaganda and censorship during the Cold War.

Discovering the Cosmos with Small Spacecraft: The American Explorer Program, by Brian Harvey (Springer Praxis, December 2017). Explorer was the original American space program and Explorer 1 its first satellite, launched in 1958. Sixty years later, the Explorer satellite program is the longest continuously running space program in the world, demonstrating to the world how we can explore the cosmos with small spacecraft. Almost a hundred Explorers have

already been launched. The book gives an account of each mission and its discoveries, breaking down the program into its main periods of activity as well as examining the politics and debate on the role of small spacecraft in space science. It introduces the launchers (Juno, Thor, etc.), the launch centers, the ground centers, and key personalities like James Van Allen, who helped develop and run the spacecraft's exciting programs.

A Fire To Be Lighted—The Training of American Astronauts from 1959 to the Present, by Tyler Peterson (Collector's Guide Publishing, December 2017). From the selection of the Mercury astronauts in 1959 to the International Space Station missions of the 21st century, the training sequence has met the challenges of preparing astronauts for flight far more often than it has failed. This book draws on interviews with 19 astronauts and Johnson Space Center instructors, as well as sources ranging from books, to articles, to technical reports and archival documents.

V2—The A4 Rocket from Peenemünde to Redstone, by Murray Barber (Crecy Publishing, December 2017). Drawing on a wide range of archival sources, rare personal accounts, and interviews conducted with personnel associated with the A4/V2 program, rocketry expert Murray R. Barber traces the origins of the V2 and presents a detailed view of the research conducted at the secret, experimental rocket-testing facility at Kummersdorf West and the vast, infamous base at Peenemünde.

Our Germans: Project Paperclip and the National Security State, by Brian E. Crim (Johns Hopkins University Press, December 2017). Drawing on recently declassified documents from intelligence agencies, the Department of Defense, the Federal Bureau of Investigation (FBI), and the State Department, this book examines the process of integrating German scientists into a national security state dominated by the armed services and defense industries.

History of Rocketry and Astronautics, Vol. 47, edited by Tal Inbar, American Astronomical Society (AAS) History Series, vol. 47, International Academy

of Astronautics (IAA) History Symposia, vol. 35 (AAS/Univelt Inc., 2017). This book contains the proceedings of the 49th History Symposium of the International Academy of Astronautics, Jerusalem, Israel, 2015.

History of Rocketry and Astronautics, Vol. 48, edited by Pablo de Leon, AAS History Series, vol. 48, IAA History Symposia, vol. 36 (AAS/Univelt Inc., 2017). This book contains the proceedings of the 50th History Symposium of the International Academy of Astronautics, Guadalajara, Mexico, 2016.

Bringing Columbia Home: The Untold Story of a Lost Space Shuttle and Her Crew, by Michael Leinbach and Jonathan Ward (Arcade Publishing, January 2018). In the aftermath of the STS-107 Space Shuttle Columbia tragedy, people and communities came together to help bring home the remains of the crew and nearly 40 percent of the Shuttle, an effort that was instrumental in piecing together what happened so the Shuttle Program could return to flight. *Bringing Columbia Home* shares the deeply personal stories that emerged as NASA employees looked for lost colleagues and searchers overcame immense physical, logistical, and emotional challenges and worked together to accomplish the impossible.

Mission Control Management: The Principles of High Performance and Perfect Decision Making Learned from Leading at NASA, by Paul Sean Hill (Nicholas Brealey Publishing, January 2018). This former Director of Mission Operations at NASA shows how to combat management weaknesses, lead stellar teams, and pull off miracles in your workplace using lessons from Mission Control.

Testbeds, Motherships and Parasites: Astonishing Aircraft from the Golden Age of Flight Test, by Frederick Johnsen (Specialty Press, January 2018). Covered in this book are scores of aircraft of all types converted for use as “flying laboratories” to test engines, wings, cockpits, and aerodynamic devices, all in the name of aviation progress. Also included are the “parasite” aircraft carried aloft to be launched and recovered by their mother ships.

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

UPCOMING MEETINGS

The annual meeting of the Oral History Association will be held **10–14 October 2018** in Montreal, Canada. Visit <http://www.oralhistory.org/annual-meeting/> for more details.

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

The Mutual Concerns of Air and Space Museums Conference will be held **2–6 November 2018** in

Pima, Arizona. Visit <https://airandspace.si.edu/events/mutual-concerns> for more details.

The annual meeting of the American Historical Association will be held **3–6 January 2019** in Chicago, Illinois. Visit <https://www.historians.org/annual-meeting> for more details.

The 2019 American Institute of Aeronautics and Astronautics (AIAA) SciTech Forum will be held **7–11 January 2019** in Orlando, Florida. Visit <https://scitech.aiaa.org> for details.

QUESTIONING KENNEDY'S CAMELOT: THE COLD WAR, THE SPACE RACE, AND A LUNAR LEGACY

By Savannah N. Jelks, Summer 2018 NASA History Intern

On 25 May 1961, President John F. Kennedy stood before a joint session of Congress, delivering a “Special Message to the Congress on Urgent National Needs.” In his message, Kennedy argued for Congress to provide the funding for the nation to be able to meet its goal of putting a man on the Moon and to invest in the space program to make such an event possible. Only a few years prior, on 4 October 1957, the Soviet Union had launched the world’s first artificial satellite, Sputnik. U.S. President Eisenhower had signed into law the National Aeronautics and Space Act establishing NASA on 29 July 1958. As the United States was preparing to make Alan Shepard the first human in space, the Soviet Union was already a step ahead. On 12 April 1961, the Soviets launched Yuri Gagarin on an orbital flight aboard Vostok 1. Shepard’s launch aboard the Mercury-Redstone 3 capsule occurred three weeks later, on 5 May 1961. The United States was once again one step behind in the space race. In light of this development, Kennedy argued that it was more important than ever to fund the fledgling American space program:

For while we cannot guarantee that we shall one day be first, we can guarantee that any failure to make this effort will make us last.... But this is not merely a race. Space is open to us now.... I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the Moon and returning him safely to the Earth.¹

Over a year later, on 12 September 1962, President Kennedy spoke again, this time from Rice University in Houston, Texas. Again, he urged the nation to consider its role in the space race:



Alan Shepard prepares for his Freedom 7 mission in 1961. (Photo credit: NASA)

We choose to go to the Moon. We choose to go to the Moon in this decade and do the other things, not because they are easy, but because they are hard, because the goal will serve to organize and measure the best of our energies and skills.²

Kennedy’s words resonated with the nation and with history. Even today, he is remembered as the leader who asked the nation to send a man to the Moon

1 John F. Kennedy, “Special Message to the Congress on Urgent National Needs,” 25 May 1961, available at <http://www.presidency.ucsb.edu/ws/?pid=8151>.

2 John F. Kennedy, “Moon Speech—Rice Stadium,” Rice University, 12 September 1962, available at <https://er.jsc.nasa.gov/seh/ricetalk.htm>.



President Kennedy speaks about the U.S. role in space at Rice University in 1962. (Photo credit: NASA)

“before this decade is out.” His personal and political desires for a lunar landing propelled decades of spaceflight and lunar activity, lasting long after his death in 1963. But as John Logsdon wrote in his book *John F. Kennedy and the Race to the Moon*, Kennedy’s feelings about NASA, lunar exploration, and the Soviet Union may have been more complex than they initially appeared.

According to Logsdon, Kennedy had very little interest in space issues as a Senator or during his presidential

campaign. His investment in the space program had little to do with personal curiosity about the solar system or pushing the boundaries of technology, but rather a burning political desire to beat the Soviets on some front of the Cold War. By the time Kennedy was elected president, NASA had developed a 10-year plan that identified dates for various mission milestones, including Project Mercury (1961–62) and a “manned flight to the Moon”³ (beyond 1970). Kennedy’s close involvement with NASA did not begin until the Soviet launch of Sputnik, and it was not until a press conference on 21 April 1961 that Kennedy publicly stated reaching the Moon as a goal: “If we can get to the Moon before the Russians, we should.”⁴ The administration had set its course.

Between the successful launch of Sputnik and the Bay of Pigs incident, the United States needed a more optimistic goal to create a sense of patriotism in the face of the Cold War. Logsdon argues that Kennedy pointed the nation toward the goal of a lunar landing, not necessarily for the challenge, but possibly because leaving the Moon to the Soviets was unthinkable chilling. Kennedy’s successive tour of NASA facilities and his speech at Rice only encouraged him, and indeed the nation, to ask, “How soon can we get [to the Moon]?”⁵ When Kennedy approached NASA Administrator James Webb in July 1962 about whether the lunar landing program was one of NASA’s top priorities, Webb had to admit that it was only “one of the top priority programs.” Kennedy stressed that sending astronauts to the Moon was vitally important for international political reasons. “This is, whether we like it or not, in a sense a race,”⁶ he emphasized. Kennedy was willing to sideline other NASA programs, but he was not willing to let the United States come in second place again.

3 John Logsdon, *John F. Kennedy and the Race to the Moon*, (New York: Palgrave MacMillan, 2010), p. 21.

4 John F. Kennedy, “The President’s News Conference of April 21, 1961,” available at <https://www.jfklibrary.org/Asset-Viewer/Archives/JFKWHA-027.aspx>.

5 Logsdon, *John F. Kennedy and the Race to the Moon*, p. 151.

6 *Ibid.*, p. 155.



President John F. Kennedy, NASA Administrator James E. Webb, and Vice President Lyndon B. Johnson are shown at Launch Complex 34 at the Cape Canaveral Missile Test Annex in 1962. (Photo credit: NASA)



President John F. Kennedy honors astronaut John Glenn after his historic first crewed orbital flight on Friendship 7 in 1962. (Photo credit: NASA)

What would have happened to the Apollo program had Kennedy not been assassinated is impossible to say. What Logsdon does suggest is that “backing off being the first to the Moon did not seem to be on Kennedy’s mind in November 1963. In remarks he planned to deliver in Dallas on 22 November, Kennedy would have said, ‘the United States of America has no intention of finishing second in space.’”⁷

It is important to recognize and remember Kennedy not just as a singularly minded visionary with a competitive goal, but as a man torn between the pros and cons of a lunar landing program and a brewing Soviet relationship. Kennedy’s ambitious proposal to the nation not only sparked America’s entrance into the space race, but also helped propel years of forward thinking and inspired a generation to fulfill his goal of landing an American on the Moon.

7 Ibid., p. 219.

ASTRONAUTS TAKE FIELD TRIPS, TOO!

By Kate Wall, Summer 2018 NASA History Intern

Astronaut: a job title that includes the potential to escape Earth’s grasp and spend time in space. It’s such a unique opportunity that it’s no wonder that, in the nearly six decades since space became accessible to humans, countless people have declared, “When I grow up, I want to be an *astronaut*.”

To many students stuck in classrooms and adults stuck in cubicles, the prospect of going to space became additionally appealing once astronauts began taking “field trips” to various places throughout North America. Beginning in January 1963—in preparation

for completing President Kennedy’s Moon landing directive—Gemini and Apollo astronauts took several Geology Field Trips (GFTs). The men underwent geologic field training led by the U.S. Geological Survey’s Branches of Astrogeology and Surface Planetary Exploration with the express intent of turning them into competent lunar scientists.

For nearly 10 years (January 1963–November 1972) leading up to and encompassing the first and subsequent Apollo lunar landing missions (Apollo 11–17), astronaut crews trained to explore the Moon using



Astronauts Dave Scott (left) and Jim Irwin of Apollo 15 sit in a Lunar Roving Vehicle (LRV) simulator called “Grover” at the rim of a crater in the Cinder Lake crater field in Arizona. (Photo credit: NASA/JSC)



Apollo 17 crewmembers Harrison “Jack” Schmitt (left) and Gene Cernan stand on the rim of Lunar Crater in Nevada wearing LSS backpacks during an EVA simulation. (Photo credit: NASA/JSC)

the only otherworldly environments they had access to on Earth. To simulate the lunar surface, they utilized impact craters and crater-like terrains in Arizona, Idaho, California, and Hawaii, as well as volcanic fields and calderas in Mexico, Alaska, Oregon, and Iceland. Locations in Canada, Colorado, Nevada, New Mexico, and Texas, among others, offered supplementary landscapes to provide the astronauts with crash courses in the geology necessary for adequately observing,

navigating, and sampling the surface of the Moon. GFTs included visits to the Lowell Observatory and Kitt Peak National Observatory, both in Arizona, to observe the Moon through telescopes.

GFTs were also used to go beyond familiarization and recognition of the lunar terrain. The trips were an opportunity to simulate lunar extravehicular activities (EVAs), practice using tools and collecting samples, undergo survival training, and use new-and-improved communication systems. The simulated EVAs included wearing the large, rectangular Life Support System (LSS) backpacks that would be worn over the astronauts’ spacesuits. Doing so allowed the astronauts to experience and practice moving and operating with the backpacks on, just as they would on the Moon. For the crews of Apollo 15, 16, and 17, Lunar Roving Vehicles (LRVs) were also present on the field trips. Using the LRV was a necessary piece of training for these missions, as they would be used to cover and sample greater areas of the Moon than could easily be covered on foot.

Apollo 17 Lunar Module pilot Harrison “Jack” Schmitt was the only professional geologist to go to the Moon. While completing his own GFT training, Schmitt used his geological expertise and his unique geologist’s perspective to help bring the other astronauts up to speed. In his opinion, field work would make the biggest impact on how successfully the astronauts would be able to execute their roles as the front-runners in lunar geology. In his own words, the goal of the field trips was to “expose them to as many different geological experiences as we possibly could. Get them out in the field—don’t let them sit in the classroom.”

The field trips made an impact, and the six Apollo missions that landed on the Moon returned with a combined total of about 2,200 individual lunar samples. Who knows? Maybe the success of astronaut field trips on Earth could convince schools to keep up their own field trips, just like the overall success of astronauts in space can convince people that they want to be astronauts, too.

IN MEMORIAM

Lunar geologist and exploration advocate Paul Spudis died of complications from lung cancer on 29 August 2018 at age 66. Spudis was a senior scientist at the Lunar and Planetary Institute, and his extensive research career was devoted primarily to our Moon. He served as deputy leader of the Clementine project, a spacecraft that orbited the Moon in 1994 to demonstrate new technologies and increase our understanding of our nearest celestial neighbor. “I had always wanted to be part of a lunar mission, and for the first time I had an intimate connection to the little spacecraft orbiting the moon, 400,000 kilometers away,” Spudis said in an undated NASA interview posted online.

NASA Administrator Jim Bridenstine announced Spudis’s death at the 29 August meeting of the National Advisory Council (NAC). He and several other NASA officials gave tribute to the late lunar scientist. “Since we’re talking about the Moon, and this is the NAC, I would tell you that he would be thrilled that we’re talking about it. We need to move forward for him and all of the other people who have worked so hard to getting us where we are.”



Pictured is lunar geologist and exploration advocate Paul Spudis. (Photo credit: Lunar and Planetary Institute)

For more on Spudis’s life and career, visit his “In Memoriam” page on the Lunar and Planetary Institute’s Web site at <https://www.lpi.usra.edu/features/083018/paul-spudis>.

A NASA interview with Paul Spudis is available here: <https://go.nasa.gov/2LDZ93R>.

NASA HEADQUARTERS HISTORY DIVISION STAFF CONTACT INFORMATION

William Barry Chief Historian	<i>bill.barry@nasa.gov</i> 202-358-0383	Elizabeth Suckow Archivist	<i>elizabeth.suckow-1@nasa.gov</i> 202-358-0375
Andres Almeida Editor	<i>andres.almeida@nasa.gov</i> 202-358-1319	Savannah Jelks Summer Intern	<i>savannah.n.jelks@nasa.gov</i> 202-358-2577
Nadine Andreassen Program Support Specialist	<i>nadine.j.andreassen@nasa.gov</i> 202-358-0087	Kate Wall Summer Intern	<i>katharine.l.wall@nasa.gov</i> 202-358-0680
Colin Fries Archivist	<i>colin.a.fries@nasa.gov</i> 202-358-0388	Rachel Carollo Fall Intern	<i>rachel.a.carollo@nasa.gov</i> 202-358-0680
Stephen Garber Historian	<i>stephen.j.garber@nasa.gov</i> 202-358-0385	Will McCormick Fall Intern	<i>william.l.mccormick@nasa.gov</i> 202-358-2577
Robyn Rodgers Chief Archivist	<i>robyn.k.rodgers@nasa.gov</i> 202-358-2798		

IMAGE IN NASA HISTORY

The NACA shield and wings logo is replaced on 1 October 1958, the day NASA officially began operations. With the new NASA insignia still in the making, the Centers had to make do by painting over or replacing the “C” in “NACA” with the “S”

in “NASA.” Today, this door at Armstrong Flight Research Center (then known as the High-Speed Flight Center) boasts the NASA “meatball” insignia, but the NASA seal was the immediate successor to the NACA logo.



CREATED AND PRODUCED BY:

Andres Almeida, Newsletter Editor
Lisa Jirousek, Editor
Michele Ostovar, Graphic Designer
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