



# NEWS & NOTES

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## FROM THE CHIEF HISTORIAN



Despite the challenges of working during a pandemic, the NASA History Division has weathered the current storm fairly well, and I am proud of the flexibility and ingenuity of our team. For some details on what has happened this spring, flip ahead to the “News from Headquarters and the Centers” section. But what I would like to call your attention to here are the recommendations from the Office of Communications History Working Group (HWG) under the Mission Support Future Architecture Program (MAP). As you may recall from previous editions of *News & Notes*, the HWG was created last fall to look at NASA’s archival and history efforts and come up with recommendations for more efficient and effective historical support for the Agency. The Working Group included a dozen people representing a wide range of backgrounds and experience in our archival and history workforce across the Agency and also included interested parties from two Mission Directorates and one from the Office of the Chief Information Officer.

The HWG has been a great group to work with, and I greatly appreciate how generous the members have been with their time and effort. As complicated as the situation has been with archivists and historians organized into various bureaucratic stovepipes across the

*continued on next page*

## SIMULATED SHUTTLE DAY (1985)

By Bob Arrighi (edited by Anne Mills)

On the morning of 30 May 1985, two student-crewed “Space Shuttle” vehicles embarked on a 4-hour mission that included experiments, data gathering, a vehicle rendezvous, and a visit to another “planet.” The Simulated Shuttle Day event, sponsored by Lewis Research Center, was a tremendous success and an unforgettable day not only for the scores of participating students but also for the NASA employees and teachers who helped pull it off.

Lynn Bondurant,<sup>1</sup> head of Lewis’s Educational Services Office, conceived of the Simulated Shuttle Program the previous summer during a workshop with teachers from two Cleveland-area elementary schools. Over the months leading up to the summer, the concept became more and more elaborate.

In the spring of 1985, the third- to fifth-grade students at the two schools enthusiastically began preparing for the missions. One principal noted, “I’ve seen kids who wouldn’t normally go to a library in a million years do research and write things for this project.” The students created flight plans, mission patches, press kits, and flight suits. Each school converted a bus into a Space Shuttle—complete

*continued on page 4*

<sup>1</sup> <https://www1.gsc.nasa.gov/glenn-history/hall-of-fame/biographies/lynn-bondurant/>

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*From the Chief Historian (continued)*

Centers—and with two Centers having no archivists and five having no historians at all—the Working Group found coming to a consensus on the key points relatively easy. In fact, the more we dug into the detailed data of organizations, staffing, budgets, and operations, the more it became obvious that the answers were quite clear, although they might not be easy to implement.

“**THE MOST SIGNIFICANT FINDING OF THE HWG WAS THAT HISTORY AND ARCHIVAL EFFORTS HAVE CONTINUED TO BE HOLLOWED OUT TO THE POINT OF NEAR COLLAPSE ALL ACROSS NASA.**”

The most significant finding of the HWG was that history and archival efforts have continued to be hollowed out to the point of near collapse all across NASA. For those Centers that still have a historian or archivist, many are so under-resourced that they cannot meet the needs of the organizations that they serve. As a result, they experience a vicious cycle of false expectations from management (“We have someone doing history or archival work, whatever that is, so we don’t have a problem”) and face the reality that organizations outside the mission support structure (i.e., programs and projects with substantial budgets) that need historical or archival support have to create history and archival operations of their own. These and many other problems were highlighted in NASA Inspector General Report 19-002, “Audit of NASA’s Historic Property.” While the Inspector General (IG) did not specifically call out the history program as a problem, the audit identified numerous problems that require archival support or historical expertise/advice to resolve. This is why the Headquarters Mission

Support Directorate handed responsibility for resolution of some of those IG recommendations to the history program. Sadly, as noted above, the history program does not have the resources to do these extra tasks or the authority/budget to hire the Center archivists and historians needed to respond effectively to the IG recommendations.

Another painfully clear finding of the HWG is that NASA has not dealt with the archival consequences of the digital revolution. When secretaries and clerks vanished from the workplace in the 1990s, they were replaced by desktop computers that—it was imagined—would automatically take care of documenting and preserving key decision-making processes. In reality, as decisions went digital, they were easy to save but hard to separate from the flood of other day-to-day communications in employee e-mail accounts or stored (in the best cases) in individually organized electronic filing systems. When employees changed jobs or lost their electronic records as a result of the all-too-common hardware/software failures, key records would vanish. The upshot is that the history program can tell you, for example, all about the management and development of Project Mercury because we have the file copies of letters and memos, but we have virtually nothing dated after 1992 on the development of the New Horizons probe to Pluto and beyond. While storage reliability has improved and search engines have become more powerful in recent years, we still do not have a systematic way to identify, capture, and preserve our history in the digital age. When researchers come calling to, hypothetically, write the book or film the movie *Hidden Figures of Artemis*, we will not be able to help them unless something changes soon.

The good news here is that a more robust and organized archival program, equipped with appropriate software, can solve this problem moving ahead. The fiscal year 2021 budget request for the history program includes a one-time major purchase of software that can reopen the flow of digital documents into our reference collections/archives. Assuming that the request is funded, we will be able to stop the flow of our history into

digital “black holes.” We will still have a big backlog of work to reestablish our archival collections from the early 1990s to the present, but our archival collection will at least be healthy moving forward.

So what has the History Working Group come up with for recommendations? There are three, and the first two are probably obvious. First, we need to staff and appropriately fund our archival efforts. The key step is to make sure that each NASA Center has a trained archivist. Some Centers may need more than one, but due to the inherently governmental nature of the decisions being made regarding Agency policy, each Center should have at least one civil service archivist. The same logic applies to historical expertise, so the HWG’s second recommendation is that each Center should have at least one Ph.D.-trained and appropriately experienced civil service historian to provide historical analysis, to fill in the gaps identified in the IG audit, and to communicate with employees and the public on historical questions. The third recommendation has to do with the bureaucratic structure of the history/archival program. At present, Centers have their archivists and historians organized within different bureaucratic stovepipes inconsistently across the Agency. The HWG recommends that NASA leadership should reevaluate the structure and placement of the history program at Headquarters and the Centers, with an eye to unifying history and archival workers in an organization at the Administrator/Center Director staff support office level. At Headquarters, this is where the history program was located—in various incarnations of the organization chart—for 40 years. It is only in the last decade that the history program at Headquarters and at some Centers has been subordinated to the Office of Communications. While the history program does provide critical support to Agency internal and external communications, its primary function has always been the collection and analysis of historical data. There is an inherent tension between gleaned the sometimes painful lessons of history and fulfilling the public affairs function. This is precisely why no other significant history program in the federal government is under the authority of their public affairs



Glenn Research Center Image Archive Storage Bunker at Plum Brook Station in 2005. (Photo credit: NASA)

or communications office. While NASA has been fortunate to have had little problem in this regard for the last decade, our arrangement is not in keeping with federal best practices and needs to change. There are probably other efficiencies that could be achieved if advisory and analytical functions related to history were grouped together in a senior staff support office, much as the Administrator and Center Directors have Chief Scientists, Chief Engineers, and others to advise them on scientific and technical matters.

The History Working Group has briefed key leaders on these recommendations and will present them through the MAP meeting process this summer. Significant decisions on these recommendations are not likely to come before the fall at the earliest. There is much work ahead of us, but we have taken the first steps to fix problems that have been both long-standing and growing worse. I am hopeful that NASA leadership will seize the opportunity to systematically address these issues in the coming months.

Until then, Godspeed,

**William P. Barry**  
Chief Historian

*Simulated Shuttle Day (1985) (continued)*

A school bus converted into a "Space Shuttle" with its crew of elementary school students in 1985. (Photo credit: NASA)

with main engines, nose cone, tail, and interior control stations.

Teachers oversaw student committees that selected 36 astronauts and 18 alternates from the multitude of applicants. Each crew included a commander, pilot, photographer, communicator, health technician, scientist, meteorologist, engineer, biologist, geologist and aerial technician. The extensive program, however, had roles for every interested student. These included devising experiments, staffing mission control and communications centers, forming medical teams, and acting as extraterrestrials.

After student-led countdowns, the two shuttles departed from their respective schools at 9:30 a.m. and 10:30 a.m. amid much fanfare. Local media and NASA photographers trailed in chase cars. During the journeys down major local thoroughfares, the crews conducted experiments and made stops to deploy balloon "satellites." The two vehicles rendezvoused

at a city park to collect rock and vegetation samples. The shuttles then visited each other's schools, where they were greeted by masked aliens. The crews then returned to their home bases, where they received mission debriefings and medical reviews. The astronauts gave brief speeches and received congratulatory messages from Sally Ride<sup>2</sup> and Caspar Weinberger. This was followed by a celebratory parade that included a red carpet and confetti.

The Simulated Shuttle Day was a triumph, and spirits were high afterward. Bondurant said, "From the people I've talked to who've seen a real Shuttle launch, there was as much or more excitement here."

"We wanted to give the kids a moment they wouldn't forget," one school principal added, "and I think we accomplished that."

The event repeated in 1987 and expanded to include eight schools.

2 <https://www.nasa.gov/feature/sally-ride-first-american-woman-in-space>

## NEWS FROM HEADQUARTERS AND THE CENTERS

### NASA HEADQUARTERS

#### Washington, DC

By Bill Barry

Just when you think you have seen it all, spring 2020 comes along with a new challenge. As you may recall, we were a bit short-staffed in our archive as the year started following Colin Fries's retirement in December. Craig Haibon did a great job of filling in the gap until his Science Mission Directorate project was done and he moved on to a civil service job (thanks, Craig!). The pandemic quarantine has complicated our contractor's search for a replacement, and we continue to operate short-handed in the archive. However, procedures for bringing on new staff while maintaining social distancing have been developed, and I am hopeful that the wait for another contract archivist will be over by the time you read this.

For most of us in the History Division, the shift to mandatory telework was relatively smooth. Headquarters has had a generous telework policy for many years, and most of the history staff worked from home on a fairly regular basis. Much of our work these days is digital, and we can function effectively from anywhere with a decent internet connection. For the archival staff, this hasn't been the case, and our contract would not have allowed Liz Suckow to work from home. Fortunately, Robyn Rodgers saw this coming and started work with our contracting office early to define archival tasks that could be done remotely. It turns out that was a pretty long list. When NASA Headquarters declared mandatory telework on March 17, we were able to keep our archive "open," and Liz got to experience NASA telework for the first time.

The situation with our interns was also complicated. Alisa Greenhalgh's semester in Washington, DC, was canceled, so she went home to Utah at the same time that we were moving into mandatory telework. Her internship with us was originally planned to end on 9 April, so it looked like we would lose her about 4

weeks early—just as we were preparing an anniversary-heavy April. Fortunately for us, Alisa was interested in continuing, and we were able to work out ways for her to stay on the history team, even without a NASA badge or computer. In fact, we were able to extend her internship to the end of April and had her help for longer than we had planned. This was a great boon because she was working on plans for the 50th anniversary of Earth Day—plans which had to be overhauled into an "at home" version. She did a great job with that while working part time for us and juggling a job on campus at Brigham Young University.

Intern Stacy Bishop lives in the Washington, DC, metro area and was able to shift into telework without an airplane flight or having to turn in her NASA laptop and badge. Her background as a teacher proved invaluable as NASA turned some attention to the question of how we could help all of the kids and parents who were now faced with the prospect of homeschooling. We "loaned" Stacy to the ad hoc team led by the Office of STEM (science, technology, engineering, and mathematics) Engagement aimed at adapting NASA materials into school-standard lesson plans. Stacy made a big contribution there and was "back" to mostly full-time history work in time for the 50th anniversary of Apollo 13. If you enjoyed our social media coverage of Apollo 13, you have Stacy to thank for it. Having immersed herself in the newly revised Apollo 13 Flight Journal (thank you, Johannes Kemppanen, for that amazing update) and the Apollo 13 in Real Time site (thank you, Ben Feist and team), Stacy created a nonstop barrage of social media enhanced with fascinating links and amazing infographics.

From your perspective, this spring may have seemed like business as usual for the history interns, but it was anything but the usual internship. In fact, Alisa and Stacy also got to experience another "first"—our first virtual intern farewell late in the day on 30 April on Microsoft Teams (we posted a screenshot of it on

Twitter and Facebook). As I write this, we are working to start our summer interns on a virtual internship at the end of May. One of the big attractions of our internship has been the opportunity to interact with folks at NASA Headquarters, and that will be difficult to do in a work-from-home situation. But our energetic intern wrangler, Cat Baldwin, pioneered the use of video chats for our spring interns to chat with some of the Headquarters staff whom they had not had an opportunity to meet. We plan to continue that this summer to provide as rich an intern experience as we can while teleworking.

One of the experiences that I thought we would have to forgo this spring was our quarterly “brown bag” history speaker series. We had planned for a lunchtime talk in mid-April by NASA SHOT (Society for the History of Technology) fellow Dana Burton, and I was about to pull the plug on it at the end of March. But based on our increased experience with videoconferencing, Steve Garber and Nadine Andreassen proposed holding the talk as a video session. Dana was willing to give her talk on her planetary protection research, and we were pleasantly surprised by the number of people who participated. We had the biggest audience for one of our brown bags in a while. In fact, it was so successful that Steve and Nadine are now planning on monthly virtual brown bags. We expect to keep this up through the quarantine. Considering the general



**CONSIDERING THE GENERAL LEVEL OF DISRUPTION THAT COVID-19 HAS CAUSED IN EVERYONE'S LIVES, THE MANDATORY TELEWORK EXPERIENCE FOR THE HISTORY TEAM HAS BEEN RELATIVELY SMOOTH.**



level of disruption that COVID-19 has caused in everyone's lives, the mandatory telework experience for the history team has been relatively smooth. We certainly miss one another's company and the chance to interact in person. But we have found that using videoconferencing tools, with a rather liberal approach to meeting agendas, has been a way to get the job done—and even to get to know each other just a bit better. The “new normal” is working well enough that when Steve was offered a great opportunity to take an assignment on detail to the Office of the Assistant Secretary of the Air Force for Space Acquisition and Integration, we were able to find a virtual backfill for Steve so that he could be free for the detail. While Steve is working at the Pentagon for the next year, Marshall Space Flight Center Historian Brian Odom will be picking up Steve's duties from his home in Alabama. So, while it has been an unusual spring, the history team at NASA Headquarters has adapted quickly and continued to operate effectively—but we do hope that 2021 has fewer surprises.

### NASA History Publications

By Steve Garber

The *Aeronautics and Space Report of the President, FY19 Activities*, is almost ready for virtual printing as a final PDF document. Thanks to Cat Baldwin for shepherding this edition of the “President's Report” through a complex maze of concurrences.

Linda Billings's edited collection of solar system exploration essays is now in copyediting at the Communications Support Services Center (CSSC). This volume includes a variety of thoughtful, interesting chapters and originated in a symposium we had several years ago on the 50th anniversary of robotic solar system exploration.

Chris Gainor's operational history of the Hubble Space Telescope (HST) is also in copyediting while simultaneously undergoing what promises to be a gorgeous layout.

The third volume of *Wind and Beyond*, an aerodynamics documentary history, is currently in layout. Edited by Jeremy Kinney and Jim Hansen, this comprehensive volume will cover airships, flying boats, and rotorcraft.

After undergoing peer review, Emily Cook is finishing revisions to her strong manuscript on the history of NASA's Stennis Space Center (SSC). This carefully researched and well-written manuscript should serve as an excellent follow-up to Mack Herring's *Way Station to Space* and focus on the 1996–2016 time period.

## AMES RESEARCH CENTER (ARC)

### Moffett Field, California

By April Gage and James Anderson

On Sunday, 8 March, Ames received notification of the first confirmed case of COVID-19 among the workforce. The emergency alerts arrived as e-mails and text messages and calls from colleagues sharing the news that the Center was now on mandatory telework, effective immediately. Many of us had participated in the Agency-wide telework exercise the previous Friday, and what began as a temporary condition has now extended into almost three months of living and working in this unprecedented time.

Just before the shift to this “new normal” occurred, the Center historian gave a talk about the history of Ames to students taking part in the NASA Community College Aerospace Scholars program. The students were at Moffett Field for a multiday workshop that took place at the end of February. The talk focused on the Center's contributions to lunar research up through the present day. Two artifacts were included in the presentation for the students to see up close: an arc jet test sample and a breccia returned by the Apollo 15 mission. The Center historian also gave an internal presentation to Center management for a new concept for the illustrated timeline of the major milestones that trace the history of Ames up to its present. A version of the timeline will be included in a new overview brochure that is under way.



Computers calculating data from the Ames 16-Foot Wind Tunnel, January 1943. (Photo credit: NACA)

Also under way are two ambitious data collection projects for which the History Archives has devised documentation strategies: *Women of Ames* and the *Ames Research Center Response to COVID-19*. The archivists teamed up with the Center historian and others to collect existing materials and create new materials to document these topics.

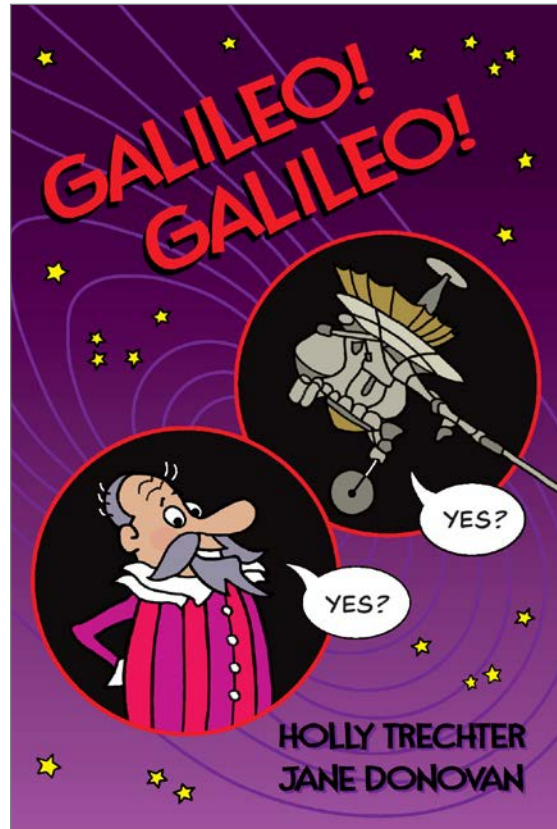
The *Women of Ames* project seeks to capture biographical information about women who have worked at Ames in order to expand and improve the information currently available in the archives. The archivists analyzed the holdings to examine the quality and quantity of data and identify gaps in coverage, and they formed a small team of interested scientists and others to tackle a two-phased approach for the project. Phase one, which involves the identification of a list of women and gathering of information such as curricula vitae, biographical sketches, memoirs, photographs, and achievements, is already under way. Phase two, the capturing of women's stories through oral interviews, is in the planning stages, with the Center historian leading efforts to develop interview topics and working methods.

The *Ames Research Center Response to COVID-19* project will capture the Center's civil servant and contractor response to the pandemic. The collection will focus on how the Center's management, operations,

communications, and culture evolve to adapt to new working conditions while ensuring workforce safety, health, and well-being, as well as how Ames responds as a research center by bringing its expertise and technical facilities, such as the NASA Advanced Supercomputing Facility, to bear on solving problems posed by the virus. One such Ames-led effort initiated by Dr. Afshin Beheshti and GeneLab is the formation of the COVID-19 International Research Team (COV-IRT). COV-IRT comprises a large and growing team of international researchers who are working together as an open science collaboration group to study the virus, understand how it impacts the host, and seek pathways to potential therapeutic options.

In other archives news, orbital space colony concept artwork from the History Archives collections presenting compelling visions of living and working in space will appear in *The High Frontier: The Untold Story of Gerard K. O'Neill*, an upcoming documentary film about the late physicist Gerard O'Neill from Princeton University. A pioneer and advocate for the design and development of space settlements, O'Neill teamed up with Ames Research Center and Stanford University in a series of summer studies in the 1970s, which culminated in the design of large-scale spaceborne habitats that could support millions of people. The trailer for the film premiered during the Yuri's Night Global World Space Party livestream. One of the paintings from this effort, featuring the interior of the Bernal Sphere settlement design by Rick Guidice, is scheduled to go on exhibition at the Swedish National Museum of Science and Technology, Tekniska Museet. The work forms a part of the popular *Moving to Mars* exhibition developed by the Design Museum in London, which is traveling to Stockholm this winter.

One final note on a topic of particular pride and delight: We just received advance copies of a graphic novel-style account of NASA's Galileo mission to Jupiter, written and illustrated by former Ames History Archives intern Holly Trechter with coauthor Jane Donovan. Written for a young audience and using commentary by the medieval astronomer Galileo



Cover illustration of *Galileo! Galileo!* The book will be released this summer. (Image credit: Holly Trechter)

as a narrative device, *Galileo! Galileo!* weaves factual information into a compelling, suspenseful, and informative story designed to connect with young readers in a humorous way. The well-researched and wonderfully illustrated graphic novel was inspired by Holly's internship work on the papers of John D. Mihalov, a NASA Ames scientist who served as co-investigator for the Galileo Probe Atmospheric Structure Instrument.

## ARMSTRONG FLIGHT RESEARCH CENTER (AFRC)

Edwards Air Force Base, California

By Christian Gelzer

As with the rest of the history program, Armstrong has been working from home since the Center restricted access.



Christian answered several image and video requests for an hour-long program on former Center pilot Don Mallick and has been working on his Prandtl project manuscript. Mallick came to work at NASA Armstrong in 1963 and became chief pilot in 1967. He flew vehicles ranging from the Lunar Landing Research Vehicle to the SR-71, and his work focused on lifting bodies. The company producing the feature is currently trying to lodge it with a network.

The Prandtl project seeks to validate an alternate span-loading, one that is 11.5 percent more efficient than the elliptical, with the added benefit of control authority. Christian conducted three interviews in May and has several more to go before he's finished.

## GLENN RESEARCH CENTER (GRC)

Cleveland, Ohio

By Bob Arrighi (edited by Anne Mills)

With nearly all schools moving to an online format for the duration of the school year in the wake of COVID-19, NASA has been increasing efforts to provide STEM education resources and content. Inspiring students in unique ways is nothing new to NASA—this summer marks 35 years since Glenn Research Center (then Lewis) led students in one of its most engaging and ambitious STEM education initiatives, Simulated Shuttle Day, which you can read about in the feature article.

## JOHNSON SPACE CENTER (JSC)

Houston, Texas

By John Uri

In mid-March, the JSC History Office staff, along with the rest of the Center, the Agency, and much of the country, transitioned to telework, quickly becoming well acquainted with Microsoft Teams as a novel form of communication. While we continue most of our work in this remote environment, the pandemic has resulted in some impacts. For example, new face-to-face interviews for the Oral History project are

temporarily suspended, although we've discussed the use of Teams, if necessary. Also, the intern program was days from making an offer to an outstanding candidate for a summer internship to help catalog archival materials, but that activity could be completed remotely, and the invitation was withdrawn. Another impact to the office is that the hiring of an archivist to oversee the JSC History Collection at the University of Houston–Clear Lake is suspended due to the overall hiring freeze at the university, with no action expected until the fall.



**TO CAPTURE THE IMPACTS OF THE CORONAVIRUS PANDEMIC ON THE JSC WORKFORCE, OUR PRODUCTION COORDINATOR SANDRA JOHNSON IS SPEARHEADING AN EFFORT TO GATHER INFORMATION IN REAL-TIME FROM THE CENTER COMMUNITY.**



To capture the impacts of the coronavirus pandemic on the JSC workforce, our Production Coordinator, Sandra Johnson, is spearheading an effort to gather information in real time from the Center community. Benchmarking efforts by several museums, universities, and libraries, the system still under development will capture information in the form of stories and other supplemental information provided by employees on the internal JSC Knowledge Management website. The information will be archived for future research and used as the first step in determining and preparing for a follow-on oral history project to capture this unprecedented event across the Center. More to come on this exciting project as it nears rollout.

Prior to the stay-at-home orders, the JSC History office team completed several oral histories. Sandra



Dr. Ross-Nazzal giving the B. K. Smith Lecture at the University of St. Thomas. (Photo credit: Dr. Jim Ross-Nazzal)

teleworking environment is that it has given the team the opportunity to process a backlog of oral history transcripts.

JSC Historian Jennifer Ross-Nazzal gave the invited B. K. Smith Lecture at the University of St. Thomas in Houston on 5 March. Her well-attended talk “Apollo and the Creation of the Clear Lake Community” summarized the effects the establishment of the Johnson Space Center had on the development of the community surrounding the Center. Lisa Munday, Chair of the History Department at St. Thomas, wrote, “Thanks so much for coming! I’ve gotten good feedback from the evening.” Attendees included the former president of the university. Dom Aquila, another history faculty member, said, “We are most grateful to you for an excellent, engaging lecture. Your work is humanizing an historical event that for many students today remains a technical-scientific achievement. Would that another project like the moonshot unify our nation’s energy in a positive direction.”

conducted an interview with former Crew Systems Photo/TV photographer and astronaut instructor William H. Bowers in February, but sadly, Bowers passed away on 6 April. Even though he was ill at the time of the interview, his determination to complete his oral history allowed us to capture a unique aspect of astronaut photography training. Sandra also conducted an interview with Justin “Jay” Rennilson, a NASA-appointed co-investigator on the Lunar Surveyor Television Experiment and Apollo Lunar Geology Investigative Teams on all missions. At 93, Rennilson is currently working with the University of Arizona’s Lunar and Planetary Department to collect, digitize, and archive all the 70-millimeter films on the Surveyor missions. They have completed all of the collection and digitization and are in preparation for submission to the Planetary Data System later this year. Interestingly, one positive note on this new

After editing and revisions by Jennifer and Sandra, Jennifer submitted her chapter “We Are Family: Apollo and the Creation of the Clear Lake Community” to the Marshall Space Flight Center Historian. The chapter will be included in an anthology to be published by the University of Alabama Press.

The JSC History Office continues to respond to research requests from a variety of sources, the need for historical research seemingly unaffected by the pandemic. The team responded to requests from within NASA, such as JSC’s External Relations Office (ERO) and the JSC Records Manager, and from universities, academies, and museums.

The JSC History Office has been actively participating in an effort led by the JSC ERO to celebrate

key moments leading up to the 20th anniversary of permanent occupancy of the International Space Station (ISS) on 2 November 2020. Feature articles memorialized Major Robert Lawrence, the first African American astronaut and after whom Northrop Grumman named the Cygnus-12 cargo resupply vehicle during African American History Month; summarized long-duration missions on the ISS; recognized the contributions of female astronauts aboard the ISS during National Women's History Month; remembered the launch of Norman Thagard as the first U.S. astronaut aboard Mir as part of the ISS Phase 1 Program; summarized preparations for the first ISS expedition six months prior to launch; reviewed the missions of Space Flight Participants; recognized the contributions of Asian American astronauts during Asian American and Pacific Islander Heritage Month; and entertained with a story about music on the ISS.

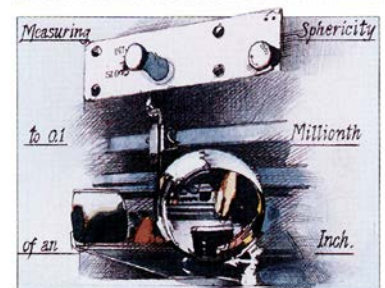
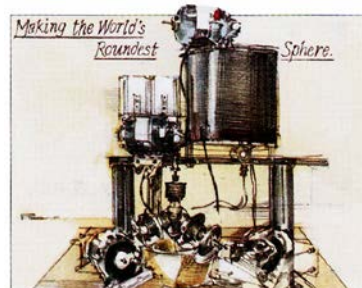
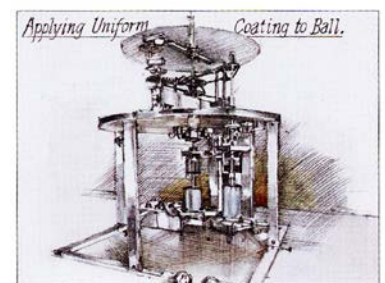
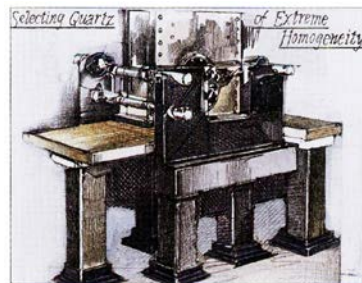
We continue to work with the JSC ERO to publish a series of articles commemorating other significant historical milestones, such as the 50th anniversaries of Apollo 13 and follow-on Moon landing missions, the 45th anniversary of the Apollo-Soyuz Test Project in July 2020, and the 40th anniversary of STS-1 in April 2021. The content is posted on the [www.nasa.gov](http://www.nasa.gov) website and JSC's Facebook and Twitter accounts. Select articles are posted on JSC's *Roundup Reads*, and abstracts of the articles appear online in JSC's *Roundup Today*. The features often highlight the anniversaries of less celebrated events and people that were nevertheless important events in the Apollo program and other spaceflight endeavors. We would like to thank history and archive personnel at other NASA Centers for their valued help and contributions to many of these products. We would especially like to thank Elaine Liston at Kennedy Space Center for her unending supply of Spaceport News back issues, uninterrupted by the coronavirus pandemic. In early April, we reached a significant milestone with the publication of the 250th article since the series began in August 2017.

## MARSHALL SPACE FLIGHT CENTER (MSFC)

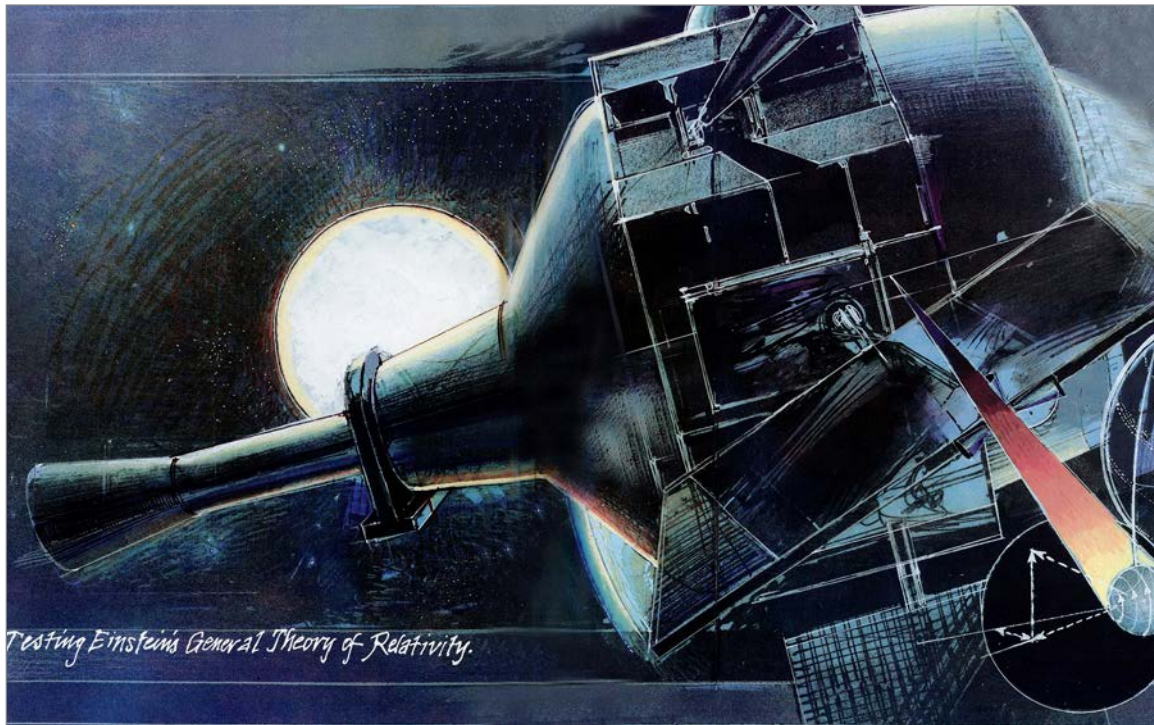
Huntsville, Alabama

By Brian Odom

In response to the COVID-19 pandemic, most of our work in the Marshall History Office and Archives transitioned to telework status in mid-March. One key project since then has been documenting the impact of the virus on the Center's workforce as well as programs and projects. This process has involved creating a collection development strategy capable of capturing the various aspects of this history, compiling a timeline of those impacts, and working with program and project managers to better understand the overall impacts. This work is part of a larger effort across NASA history and archival programs to document this important history. Historical and archival efforts also reflect actions across the Agency, including those of NASA's Earth Science Division, to utilize satellite data in order to gain a clearer understanding of environmental, economic, and social impacts of the pandemic, including the impact of air pollution reduction on the atmosphere.



This series of illustrations demonstrates the incredible technologies necessary to fabricate the 1.5-inch-diameter quartz rotors that were within 40 atomic layers (0.3 millionth of an inch) of a perfect sphere. (Image courtesy of Stanford University)



This illustration is of the Gravity Probe B spacecraft. Located in the lower right corner of the illustration is a diagram of the predicted movement of the gyroscope in response to both the frame-dragging effect (39 milliarseconds/year) and the geodetic effect (6,606 milliarseconds/year). (Image courtesy of Stanford University)

As part of continued research into the history of Gravity Probe B, a program launched in 2004 to test two aspects of Albert Einstein’s theory of general relativity, I recently had the opportunity to interview (by phone) preeminent artist and illustrator Barron Storey. Born in Dallas, Texas in 1940, Storey trained under Robert Weaver at the New York School of Visual Arts. His long list of credits as an illustrator include Neil Gaiman’s *The Sandman: Endless Nights* (Vertigo, 2011), *The Absolute Sandman*, volumes two (Vertigo, 2007) and five (Vertigo, 2011); and the iconic cover artwork for the 1980 reissue of William Golding’s novel *Lord of the Flies*. Storey’s work has certainly received much acclaim, with Neil Gaiman once describing him as “a visionary; the man behind the eye.”

Storey’s connection with Gravity Probe B began in 1987 when the Stanford University group, led by

Francis Everitt, approached him about illustrating a promotional brochure entitled “Gravity Probe B: Testing Einstein with Orbiting Gyroscopes.” This was not Storey’s first project for the space program. In 1979, he produced one of the first illustrations of the completed Space Shuttle—an illustration that currently resides at the National Air and Space Museum in Washington, DC. Storey remembered wanting to create something that would be a “celebration of the science and a celebration of Einstein’s genius,” but also an “accessible vision of the people who were making it happen.” Storey contends that the “success of the project was an indication that artists and scientists can work together to a mutual advantage.” The final illustrated brochure proved remarkably effective in conveying the program, and the science behind it, to both the public and members of the United States Congress.

## EXCERPT FROM *THE PARTNERSHIP: A HISTORY OF THE APOLLO-SOYUZ TEST PROJECT*

July marks the 45th anniversary of the Apollo-Soyuz Test Project (ASTP), a joint mission between the Soviet Union and the United States. ASTP became a symbol of peace between two opposing nations and helped create the international cooperation we foster in the space industry today. The excerpt below is from the introduction of *The Partnership: A History of the Apollo-Soyuz Test Project*, where the authors set out their process for writing this history.

This history is an official history only because it was sponsored by NASA. The authors were invited through a contract to record their version of the events that led to, shaped, and emerged from the joint flight. When we first met with Glynn S. Lunney, the American Technical Director for ASTP, we asked, “Why do you want to have a history written?” Lunney responded that he had never asked himself precisely that question but that he did desire to see preserved the subtlety of human interaction that he had observed during the first four years of the project. Lunney went on to suggest that the technical aspects of ASTP were not nearly as interesting, or perhaps as significant, as the working relationships that had emerged among the technical specialists of the two nations. Written documents tend often to be dry and distilled he thought. Lunney wanted a historian to see firsthand some of the personal interplay so that the flavor of the working sessions could be preserved along with the story that could be found in more conventional documents.

Our history is to a large extent based upon oral records. Sometimes dubbed “combat historians,” or less favorably, “instant historians,” we stalked the halls of the joint meetings in Houston with tape recorders in hand. Although never quite a part of the furniture, we were not an apparent disturbance to any of the negotiations we witnessed. And although we never traveled to the Soviet Union, those who did gave freely of their



Astronaut Vance D. Brand (left), Command Module pilot of the American ASTP first (prime) crew, and cosmonaut Valeriy N. Kubasov, engineer on the Soviet ASTP prime crew participate in training for the Apollo-Soyuz Test Project in Building 35. (Photo credit: NASA)

time, recollecting their experiences or answering our questions. Sometimes we cornered them in the halls between negotiating sessions, at other times by telephone. But whether it was over a quick cup of coffee while they waited for Xerox copies of a document or during a hamburger break, these men and women went out of their way to help, to explain, and to re-explain.

The book that emerged from these efforts has both strengths and weaknesses. First, we have told essentially the NASA side of the story. We had free access to American materials and members of the NASA team. In addition, NASA has an ongoing history program, which makes the historian’s task an easier one. Most of the information on earlier programs is readily at hand in published histories or works in progress. The Soviet space program by contrast is shrouded in mystery. The Soviets have not produced any comparable historical studies of their programs, and when we requested Soviet assistance with this history we were informed politely, but firmly, that they did not wish to discuss history. As a consequence, we had only limited opportunities to speak with members of the Soviet ASTP

team. Where possible, to balance our presentation, we have cited Russian language sources, but our story remains one told from the American perspective.

Second, history written as events are unfolding can be neither entirely objective nor complete. But we have attempted to be fair in our judgments as we explained what the project meant to the participants through their personal recollections—recollections that otherwise might not have been preserved. We have tried to write an interesting narrative, sufficient in technical detail for the intelligent reader to grasp the mechanical elements of ASTP, but simple enough so that pages do not become bogged down by complex description. Those who worked on ASTP know that for every page of description in this history there are often hundreds of pages of technical documents, thousands of feet of computer tape, and seemingly endless hours of work. Some will be dismayed that their efforts were passed over or given only a line or two, but our goal has been to preserve some of the spirit of ASTP with the hope that some historians in the future will evaluate the project's significance more fully. Years will pass before we know if the partnership of so many engineers, spacemen, negotiators, and diplomats represents a stepping stone, plateau, or pinnacle in the history of international cooperation. Only time will determine the true perspective of their performance.

Third, there are topics that we chose not to discuss in detail because they will be recorded in other NASA



Docking Module pilot Donald K. Slayton with no shirt on, wearing medical sensors during the Apollo-Soyuz Test Project in July 1975. (Photo credit: NASA)

publications. For example, we did not describe in depth the manufacturing history of the Apollo spacecraft, since that is covered in the fourth volume of *The Apollo Spacecraft: A Chronology* (NASA SP-4009) and is the subject of the forthcoming history *Chariots for Apollo*. We may be accused of slighting certain groups—the State Department, the Department of Defense, or Rockwell International, the spacecraft contractor. But we think that our treatment of these organizations in this history reflects adequately their participation in ASTP. More than any single manned space flight before, ASTP was a Johnson Space Center enterprise. Technical negotiations were conducted almost exclusively by personnel from Houston. Even NASA Headquarters typically assumed an advisory and supportive role, with the notable exception of Deputy Administrator George M. Low, who played a central part in planning and directing the program. When it came to the design of the docking system and the docking module, the JSC engineers took the lead and basically told the contractor in detail what they wanted. Again, this was a departure from earlier programs and does not reflect the manner in which the Space Shuttle was to be developed. We hope our book adequately reflects the unique nature of Apollo-Soyuz.

Because the flight of Apollo and Soyuz can be understood only in the international context from which it emerged, we have presented two introductory chapters that describe the early years of Cold War competition (chap. I) and the first efforts at cooperation (chap. II). The next chapter describes the evolution of manned spacecraft in the U.S. and U.S.S.R. (chap. III), while “Mission to Moscow” (chap. IV) outlines the experiences of the American technical specialists during their first visit to the U.S.S.R. in October 1970. In January 1971, discussion about cooperation in space flight turned from general talk of the “future” to specific proposals for a test mission using existing hardware (chap. V). During the ensuing 16 months, NASA and Soviet Academy engineers began to learn to work with one another, and by May 1972 the two sides were confident that they could design and build the necessary hardware by mid-1975 (chap. VI). Once given the official seal of approval at the Nixon-Kosygin Summit in



Astronaut Thomas P. Stafford, commander of the American ASTP prime crew, and cosmonaut Aleksey A. Leonov, commander of the Soviet ASTP prime crew, training at Johnson Space Center. (Photo credit: NASA)

May 1972, work began in earnest toward the creation of a test project (chap. VII). As the hardware evolved, the United States and the Soviet Union monitored progress with reviews, planned public release of ASTP information (chap. VIII), and selected their crews, who began their technical and linguistic training for the flight (chap. IX). Final reviews of the project were held in the spring of 1975, while critics questioned the wisdom and safety of the joint mission (chap. X). All the efforts culminated in a nearly flawless flight in July 1975 (chap. XI), and the only unanswered question concerned what the future would hold for cooperation in space between two nations that had dared to break down old rivalries. As for accolades to those who helped us with this history, their names are best preserved in our essay on sources, which describes the materials we used, where they came from, and how they are arranged for future use. On 24 July 1975 after Apollo had splashed down and the crew was aboard the U.S.S. New Orleans, we chanced to encounter Glynn Lunney as he left the Mission Operations Control Room. Suit coat over his shoulder, he smiled and said, “Now you have a story to tell.” He was right.

“

**ALL THE EFFORTS CULMINATED IN A NEARLY FLAWLESS FLIGHT IN JULY 1975... AND THE ONLY UNANSWERED QUESTION CONCERNED WHAT THE FUTURE WOULD HOLD FOR COOPERATION IN SPACE BETWEEN TWO NATIONS THAT HAD DARED TO BREAK DOWN OLD RIVALRIES.**

”

Edward Clinton Ezell  
Linda Neuman Ezell  
Houston, July 1976

Read the full book for free here:  
<https://history.nasa.gov/SP-4209.pdf>

## OTHER AEROSPACE HISTORY NEWS

### AMERICAN ASTRONAUTICAL SOCIETY (AAS)—HISTORY COMMITTEE

By Michael Ciancone

#### 2019 Emme Award for Astronautical Literature

The Emme Award Panel, chaired by Dr. Don Elder, is early in the process for soliciting and reviewing selected titles. Other members of the panel are Dr. Rick Sturdevant, Dr. Jennifer Levasseur, and Dr. De Witt Kilgore.

#### International Academy of Astronautics History Series

The series editor, Dr. Rick Sturdevant, reports that the edited papers for International Astronautical Congress 2017 (Adelaide, volume editor: Michael Ciancone) are in the hands of Univelt. The edited papers from IAC 2018 (Bremen, volume editor: Hannes Mayer) are on hold. The edited papers from IAC 2019 (Washington, DC, volume editor: Ofrid Liepack) are expected by the end of August 2020.

Springer-Nature will assume publication of future History Series volumes following the 2019 volume. Univelt will continue publication of material in hand as of March 2021. This represents a clean break since we will not have proceedings for 2020 due to the impact of the novel coronavirus on IAC plans.

#### Korolev Presentation

Michael Ciancone and Professor Asif Siddiqi provided a virtual presentation of early nonfiction books about spaceflight, with a focus on Russian publications, at the Korolev Academic Conference. The January 2020 presentation, held in Moscow, highlighted entries from *Foreword to Spaceflight* (2018), which compiles the most extensive list of rocket and spaceflight-related publications published prior to the launch of Sputnik in 1957. The authors described key monographs, influential authors, and general trends in publishing on space exploration in the first half of the 20th century, before spaceflight became a reality (January 2020: Moscow, Russia).



8 July 1975: The three American ASTP prime crew astronauts participate in a photography mission briefing with Dr. Farouk El-Baz (wearing face mask) during Apollo-Soyuz Test Project preflight activity at NASA's Johnson Space Center. They are, from left to right, Thomas P. Stafford, commander; Vance D. Brand, command module pilot; Dr. El-Baz; and Donald K. Slayton, docking module pilot. Dr. El-Baz is with the Center for Earth and Planetary Studies, National Air and Space Museum, Smithsonian Institution. The face mask is to protect the crewmen from possible exposure to disease prior to launch time. (Photo credit: NASA)

## CALL FOR PAPERS

### NASA and the Rise of Commercial Space Symposium, 18–19 March 2021

NASA's Marshall Space Flight Center (MSFC) History Office and the University of Alabama in Huntsville (UAH) History Department are pleased to invite paper proposals for a two-day symposium in Huntsville, Alabama, exploring the history of commercial space to the present day. Today, the commercial space industry is taking on an increased leadership role and position of innovator in both space access and exploration. This growth of commercial space over the past decades offers the potential for a new paradigm for space exploration—one in which industry transitions from supplier to partner. Still, many questions remain. These questions span from the most seemingly consequential, "How will humanity explore the Moon and Mars?" to the most basic, "What is 'commercial space?'"



To develop further the historical context of commercial space—and thereby better inform decision-making at NASA going forward—the organizers of this symposium invite proposals on a broad range of topics related to the history of commercial space operations, including, but not limited to, the following:

**Contextualizing “Commercial Space”:** How has the concept of commercial space evolved in different fields and disciplines? Submissions can address topics of interest in fields of policy, law, environment, political science, economics, or organizational studies.

- Evolution of United States and international commercial space policy
- Pre-NASA conceptions of commercial space activities
- Environmental impacts of commercial space
- Social history of commercial space
- Historical impact of innovative technologies

**Exploring the History of Nongovernmental Activities:** What have been the major events and milestones in the emergence and evolution of commercial space activities in the United States and internationally?

- Commercial space in United States and international law/property rights/space mining
- Commercial analogs for space exploration and exploitation
- Development of commercial efforts in space tourism, colonization, and exploration
- Commercial activities in low-Earth/geosynchronous orbit
- Public perception of space tourism (suborbital vs. orbital, lunar, Mars)
- Advance of the philosophy, economics, and politics of commercial space

**Examining Relevant Government Activities Past and Present:** How has the U.S. government assisted or impeded the emergence and evolution of commercial space activities?

- Origins of programs such as Commercial Crew
- Comparison of commercial space industry to Apollo/Shuttle procurement models
- Comparative experiences in commercialization from governmental and private industries
- Applicable experiences of national security and civil space programs
- Development of public-private partnerships at NASA

The format of the symposium will be a combination of panel discussions, keynote talks, and group discussions. The intended outcome is a deeper understanding of the relationship between NASA and commercial space as well as an improved definition of commercial space. As part of this goal, each presenter must also propose a definition of “commercial space” and develop that definition as it relates to their chosen topic. The intention is to publish an anthology of selected papers.

As part of the effort to offer insight to broad constituencies, the organizers envision a range of products emerging from this symposium. The possibility of online blogs and other means of communication are being considered, as is a fully referenced edited collection of essays on the origins and development of commercial space activities. Participants are invited to make their presentations available in written form for dissemination.

#### 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 affiliation, by 1 November 2020, to Dr. Brian C. Odom at [brian.c.odom@nasa.gov](mailto:brian.c.odom@nasa.gov) or Dr. Stephen P. Waring at [warings@uah.edu](mailto:warings@uah.edu).

Decisions about acceptance will be made by 1 December 2020.

For more information, contact Brian Odom at [brian.c.odom@nasa.gov](mailto:brian.c.odom@nasa.gov)

## SMITHSONIAN NATIONAL AIR AND SPACE MUSEUM (SNASM)

By Margaret Weitekamp

The curatorial departments, including Space History, Aeronautics, and the Center for Earth and Planetary Studies, at the Smithsonian's National Air and Space Museum began teleworking full time on Friday, 13 March 2020. Although it has been a significant adjustment, the curators' work has been well-suited for being done from remote settings. Even before March ended, Senior Curator Mike Neufeld met the members of the Reston Book Club online to discuss his book *Von Braun*.

**“ FORTUNATELY, THE MUSEUM'S INCREASED EMPHASIS ON EXTENDING THE SNASM EXPERIENCE BEYOND THE WALLS OF THE BUILDING HAD CREATED A STRONG BASIS ON WHICH TO BUILD VIRTUAL PROGRAMMING. ”**

Fortunately, the museum's increased emphasis on extending the SNASM experience beyond the walls of the building had created a strong basis on which to build virtual programming. Within a week or so, the Museum's Education department led the staff to begin broadcasting a moderated Facebook Live Chat featuring curators or special guests at least once a week. That program solidified quickly into a regular Thursday 1 p.m. timeslot. One such chat featured Tom Watters of the Museum's Center for Earth and Planetary Studies paired with Space History curator Jennifer Levasseur to talk about Moon photography. Curator Cathleen Lewis and conservator Lisa Young presented about spacesuits, including their work on the conservation of Neil Armstrong's Apollo 11 lunar suit.

Using these resources and others, the Space History department supported the 50th anniversary of Apollo 13 through blog posts and online programming. A signature highlight was Apollo curator Teasel Muir-Harmony appearing as a guest alongside Captain Jim Lovell on the Air and Space Live Chat carried on Facebook. Muir-Harmony also joined NASA Chief Historian Bill Barry and Ben Feist, creator of the website *Apollo 13 in Real Time*, for a Reddit “Ask Me Anything” about Apollo 13. One evening, department chair Margaret Weitekamp joined Jeff Kluger, the space journalist who wrote *Lost Moon* with Lovell, on Facebook Live. Together they held a film discussion with the public about Ron Howard's *Apollo 13* (1995), which was based on *Lost Moon*.

At the same time, curator Martin Collins was one of the leaders of the Smithsonian-wide effort to commemorate the 50th anniversary of the first Earth Day. The Earth Optimism Summit that had been meticulously planned as a live, in-person event, was hastily—but successfully—converted into a digital summit. The diverse slate of international speakers, including such notables as chef José Andrés and businessman David Rubenstein, were introduced with remarks from Smithsonian Secretary Lonnie Bunch. According to the webpage <https://earthoptimism.si.edu>, “More than 55,000 devices in over 170 countries tuned in to watch our 102 hours of live stream. The hashtag “#EarthOptimism” reached over 19 million people during the Summit.” Collins also published blog posts on the Museum's webpage as well as the *Smithsonian* magazine's blog.

The Museum also marked the 30th anniversary of the deployment of the Hubble Space Telescope. Senior curator David DeVorkin published a piece on Dr. Nancy Grace Roman in *Physics Today*. In addition to DeVorkin's blog post and one by Stanford's Elizabeth Kessler, the regular Thursday Facebook Live included Dr. Jennifer Wiseman, a senior astrophysicist at NASA's Goddard Space Flight Center; Dr. Lou Strolger, observatory scientist at the Space Telescope Science Institute; and NASA astronaut Mike Massimino, who flew on two Hubble Servicing Missions.



The Apollo Lunar Module below the Spirit of St. Louis in the Boeing Milestones of Flight Hall. (Photo credit: National Air and Space Museum)

The Museum has also been supporting the 75th anniversary of the end of World War II with a series of blog posts authored by curators, including one titled “The Myth of the German ‘Wonder Weapons’” by Mike Neufeld. Unfortunately, the Arsenal of Democracy fly-in planned for early May to mark the 75th anniversary of V-E Day has been postponed.

Margaret Weitekamp and David DeVorkin also participated with illustrator and Museum educator Diane Kidd in an online reading of their children’s book *Pluto’s Secret* as a part of the Museum’s digital *Story Time* program.

The Exploring Space lecture series has also been converted to an online format, with the first presentation on 2 June. Sheperd Doeleman, founding director of the Event Horizon Telescope Collaboration, also of the Smithsonian’s Astrophysical Observatory, spoke about the Event Horizon Telescope project.

In other kinds of outreach, Teasel Muir-Harmony appeared on a teleconference panel about jobs outside of the academy for the Massachusetts Institute of Technology’s History, Anthropology, Science, Technology and Society (HASTS) Program seminar. The Museum’s *AirSpace* podcast team, which includes Space History curator Matthew Shindell, also started producing new mini-episodes focusing on films. One of the first featured a discussion about *Troop Zero*, focusing especially on the depiction of space themes and the Voyager golden record.

Although the pace has been slowed, the Museum’s construction efforts have been able to continue under new guidelines for cleaning, mask-wearing, and distancing. As was described in a previous update, half of the Museum’s downtown building was evacuated and shuttered to allow for demolition beginning in December 2018. Once the west end of the building had been taken back to the studs, the reconstruction began. Inside, the walls, stairways, and doorways

that will define the renovated space are being built. Outside, the first exterior stones of the building have been reinstalled. Even ahead of the completion of the “black box” exhibit spaces inside, there are already some artifacts—those which were too large or cumbersome to move—still on site. In May, the massive F-1 engine that had been a signature of the Apollo to the Moon gallery since it opened in 1976 was hoisted and moved across the building to a new location down the hall. Now hanging vertically, it will be featured in the new, reimagined “Destination Moon” exhibit.

All the while, the curators have continued their planning efforts for new exhibits planned as a part of revitalization and transformation. Although these meetings were once held in conference rooms with the design contractors on the other end of teleconference calls, now all of the team members, as many as a dozen and a half at a time, log into the meetings through Microsoft Teams or other software. It’s not nearly as fun. Gone are the witty asides between colleagues or diversions for jokes or movie references inspired by the content. But the actual work can continue quite well, and plans are coming together for the second half of the Museum’s immense renovation.

To counter the grind, the Museum’s internal lunchtime brown bag presentations have continued as Teams meetings, allowing curators to share their research with each other in a less formal setting. For instance,

just before the isolation began, Jim David gave a talk titled “The 60th Anniversaries of America and the World’s First Two Successful Spy Satellites—GRAB and CORONA.” The Space History department also started hosting weekly happy hours on Thursday evenings, inviting a different department from the Museum to join us as guests each time. It’s still a teleconference, but we do get to catch up a little.

The Museum is excited about several new books. Matthew Shindell’s biography of Harold Urey from the University of Chicago Press, *The Life and Science of Harold C. Urey*, has been well reviewed since its publication in December 2019. David DeVorkin’s definitive *Fred Whipple’s Empire: The Smithsonian Astrophysical Observatory, 1955–1973* is available online for download from the Smithsonian Institution Scholarly Press at <https://scholarlypress.si.edu/store/history-american-culture/fred-whipples-empire-smithsonian-astrophysical-obs/>. Aeronautics curator Alex Spencer’s new book, *British Imperial Air Power: The Royal Air Forces and the Defense of Australia and New Zealand Between the World Wars*, appeared from Purdue University Press. Also from Purdue University Press and also in June, Jennifer Levasseur published *Through Astronaut Eyes: Photographing Early Human Spaceflight*. Moreover, Michael Neufeld’s *Spaceflight: A Concise History* (MIT Press, 2018) will appear in a Chinese translation later in 2020 and an Arabic translation in 2021.

## UPCOMING MEETINGS

The Experimental Aircraft Association (EAA) AirVenture is **canceled** due to COVID-19. Visit <https://www.eaa.org/en/airventure> for more details.

The annual meeting of the Society of American Archivists will be held virtually **3–8 August 2020**. Visit <https://www2.archivists.org/conference> for more details.

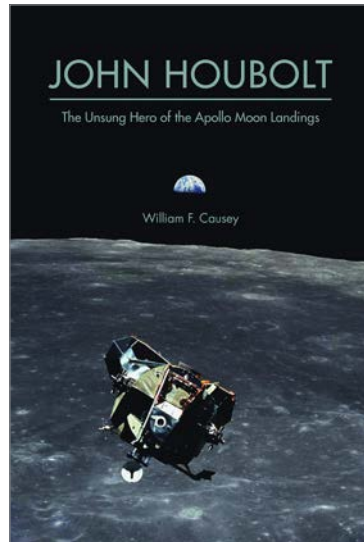
The annual meeting of the Society for Social Studies of Science (4S) will be held virtually **18–21 August 2020**. Visit <http://www.4sonline.org/meeting> for more details.

The annual meeting of the Society for the History of Technology is exploring options for virtual panels in **October 2020**. Visit <https://www.historyoftechnology.org/annual-meeting/> for more details.

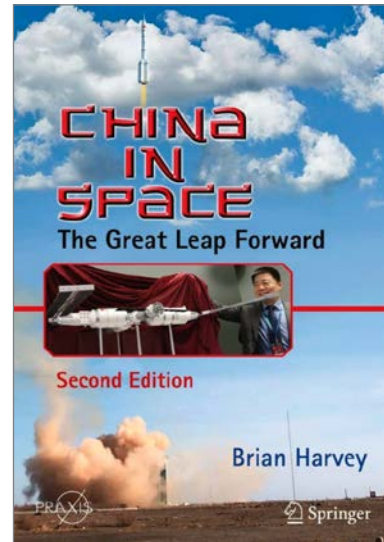
## FEATURED PUBLICATIONS



Howard McCurdy, *Financing the New Space Industry: Breaking Free of Gravity and Government Support* (Palgrave, 9 November 2019)



William Causey, *John Houbolt: The Unsung Hero of the Apollo Moon Landings* (Purdue University Press, 15 March 2020)



Brian Harvey, *China in Space: The Great Leap Forward*, second edition (Springer, 2019). (Correction to title in previous newsletter.)

*Disclaimer:* These are collected from promotional materials and do not represent an endorsement by NASA.

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## THE MAN WHO FELL TO EARTH: REMEMBERING AL WORDEN, 1932–2020

By Mark Stewart



Astronaut Al Worden inspects a Saturn V model. (Photo credit: NASA)

*“Quietly, like a night bird, floating, soaring, wingless. We glide from shore to shore, curving and falling but not quite touching; Earth: a distant memory seen in an instant of repose, crescent shaped, ethereal, beautiful, I wonder which part is home, but I know it doesn’t matter...the bond is there in my mind and memory; Earth: a small, bubbly balloon hanging delicately in the nothingness of space.”*

—Al Worden

*“Planet Earth is blue and there’s nothing I can do.”*

—David Bowie from Space Oddity,

The best of the Apollo astronauts brought something back with them from the Moon: a creative gift that opened new avenues in their lives. Some chose to paint, others to write. Al Worden’s book *Falling to Earth* is one of the most vivid accounts of what it was actually like to voyage to the Moon and back.

While Neil Armstrong chose to avoid publicity after leaving the first set of boot-prints in the lunar dust, publicly re-engaging with spaceflight only toward the end of his life, Worden was a champion of space exploration for the rest of his days. He should be remembered and celebrated for that—and for standing up to congressional pressures when there were those who sought to fire him nine months after the end of his Apollo mission. Some men grow in stature in the face of adversity, and Worden was one of them.

While his companions spent three days on the lunar surface, Worden orbited the Moon, circling the mysterious far side of the cratered globe in a remarkable feat of solo endurance, bringing to mind another line from Bowie’s “Space Oddity”: “here am I floating in my tin can.” Like a character in a J. G. Ballard short story, Worden experienced the dislocating effects of being marooned so far from Earth, passing in his capsule beyond all hope of rescue and retrieval, his spacecraft a radio beacon passing in and out of the lunar night.

He did come back, of course, along with his fellow space voyagers; but the experience moved him to reflect that the real purpose of the mission had not been to take a closer “look at the Moon, but to look back at our home, the Earth.” In this, he was continuing with a project uniquely suited to astronauts: the redrawing of interplanetary perspectives, as begun



**...THE EXPERIENCE MOVED HIM TO REFLECT THAT THE REAL PURPOSE OF THE MISSION HAD NOT BEEN TO TAKE A CLOSER “LOOK AT THE MOON, BUT TO LOOK BACK AT OUR HOME, THE EARTH.” IN THIS, HE WAS CONTINUING WITH A PROJECT UNIQUELY SUITED TO ASTRONAUTS: THE REDRAWING OF INTERPLANETARY PERSPECTIVES...**



by the crew of Apollo 8 with their famous “Earthrise” photo. His comments also prefigured much of the Green Movement, with its emphasis on seeing our one world as an ark of all living things, a repository of the planet’s biomass.

In the long fall back to Earth, so like the descent from the summit of a mountain, Worden spacewalked, suspended above an incalculable abyss, tethered to the Moon-vehicle by a single lifeline—a technological umbilical—with Earth rising above a dark horizon, still impossibly remote but all the while drawing closer through the night of long shadows. Worden eventually returned from his solo trek, clambering back through the hatch of the capsule, a sealed airlock that would not open again until splashdown. All three of the Moon voyagers (Worden, David Scott, and James Irwin) returned as changed men, reunited with their home world, and ready to embark on the true starting point of their mission: coming to terms with all that it meant to have visited another world.

It is tempting to view the surviving astronauts as a dwindling fraternity. One thinks of the quiet demeanor of Michael Collins, the pugnacity of Buzz Aldrin

(surely the most human of all the sons of Apollo), and the capability and resourcefulness of Ken Mattingly, who did so much from Mission Control to support his fellow space travelers, particularly during the Apollo 13 incident. But in a very real sense, this fraternity is not diminishing at all. Those who help to shape the course of history—especially explorers—never really die. They live on in our collective memory, which is perhaps the only true form of immortality that any of us can hope for.

By these standards, Al Worden will always be with us—falling back to Earth from his lonely outpost, circling the Moon as the Command Module pilot on the Apollo 15 expedition. He may not have walked on that airless world, but in traveling to and from that distant goal, he took giant steps of his own.



Al Worden, Command Module pilot of the Apollo 15 lunar landing mission, floats in space outside the spacecraft during his trans-Earth extravehicular activity (EVA). (Credit: NASA)

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