



NEWS & NOTES

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FROM THE CHIEF HISTORIAN



I am both tickled and sad to report that this will be the last *History News & Notes* prepared under the incredible stewardship of Andres Almeida. Tickled because Andres has been offered the incredible opportunity of managing the Smithsonian Institution's Transcription Center. The Center is an amazing digital volunteer effort that will achieve even greater things with Andres's leadership, dedication, and creativity. (Check out their Web page at <https://transcription.si.edu>.) While I have long expected that someone of Andres's incredible drive and talent would be poached away from us soon, I am also sad that the day has actually arrived. We will sorely miss his contributions on so many fronts, but also his quirky humor, his Spanish word of the day, and even his colorful socks. He leaves us at the end of August with our very best wishes and an expectation that we'll be seeing him again soon.

In the run-up to the Langley centennial this summer, I failed to call attention to another important transition that happened at the start of June. Gail Langevin, the History point of contact for many years at Langley Research Center, retired after 34 years of government service. Gail's last project was managing the Langley Hall of Honor induction on 1 June

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ECLIPSES AND SOCIETY THROUGH THE AGES

By Jordan Carter, NASA History Division Intern

The total solar eclipse on 21 August 2017 was a much-anticipated event that received wide publicity throughout the United States. Today, we know how eclipses happen and can predict them with great accuracy. It took centuries to fully understand the celestial phenomenon, however. Eclipses have intrigued humans since we first started observing them, and in ages past, they garnered some interesting reactions.

The gradual darkness that comes with an eclipse could have chaotic effects on an uninformed populace. Ancient rulers sometimes enjoyed godlike status in their societies, and the ability to predict an eclipse would have affirmed their authority. On 22 October 2134 B.C.E., a total solar eclipse was seen in China. The emperor, his astronomers, and his subjects were surprised by the Moon's obfuscation of the Sun. The emperor's royal astronomers, Hsi and Ho, were accused of perpetual drunkenness that made them fail to predict the eclipse. The emperor was unable to lead the traditional ceremonies that were meant to preserve the Sun, and although the Sun "survived," the drunk astronomers did not—they were swiftly executed.

Sometime around the 14th or 13th century B.C.E., observers in the Mesopotamian city of Ugarit (now modern-day Syria) recorded a solar eclipse on

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From the Chief Historian (continued)



WHILE I HAVE LONG EXPECTED THAT SOMEONE OF ANDRES'S INCREDIBLE DRIVE AND TALENT WOULD BE POACHED AWAY FROM US SOON, I AM ALSO SAD THAT THE DAY HAS ACTUALLY ARRIVED. WE WILL SORELY MISS HIS CONTRIBUTIONS ON SO MANY FRONTS, BUT ALSO HIS QUIRKY HUMOR, HIS SPANISH WORD OF THE DAY, AND EVEN HIS COLORFUL SOCKS.



2017. (See <https://www.nasa.gov/feature/langley/naca-and-nasa-langley-hall-of-honor-class-of-2017>.) She retired the next day, 2 June. Her primary duty at Langley was as a public affairs specialist, but Gail put a huge amount of effort into her “additional duty” as history point of contact. In fact, her efforts were recognized with the annual NASA History Award this spring. Nominations for this award come from historians and archivists across NASA, and it is presented by the Headquarters History Division for excelling in the promotion of NASA history inside and outside the Agency. It was a most well-deserved honor. For the time being, Rob Wyman, Lead Public Affairs Specialist at Langley, is filling the history point of contact role. We wish him all the best and hope that Gail will enjoy a long and fruitful retirement.

Those of you who have been reading this newsletter for a while will know that we typically devote the last issue of the calendar year (the December edition) to an overarching historical theme. This year we will be marking the 60th anniversary of the start of the Space

Age in the December issue. The launches of Sputnik and Sputnik 2 in October and November 1957 were landmark events in technology history. They also had ripple effects across the world that can be felt to this day in nearly every aspect of human endeavor. They prompted an acceleration of U.S. space efforts (initially with embarrassing effects) and led directly to the creation of NASA the following year. While we will devote much attention over the coming year to the 60th anniversary of NASA's opening for business on 1 October 1958, our hope is that with our December newsletter issue, we will be able to take a broad look at some aspects of the start of humanity's exploration beyond Earth that you may not have considered. If you have been considering these things yourself already, I invite you to send me an article for possible inclusion in the December newsletter. We are always looking for interesting and thought-provoking contributions. I urge you to give it a try.

As you may know, we are still struggling along without a Chief Archivist. Over a year has gone by since Jane Odom retired, and we are still working to get approval to hire a replacement. Steve Garber has been bearing most of the burden, but despite his many talents, he is not a professionally trained archivist (and neither am I), so Agency-wide archival challenges continue to grow. We continue to advocate for approval to hire. Keep your eyes on <http://www.usajobs.gov> for a new posting for Chief Archivist; we hope that it will appear in the very near future. In the meantime, as many of you may already know, Jane Odom is facing some post-retirement health challenges. I know that she would welcome your thoughts and prayers.

Good health and Godspeed,

William P. Barry
Chief Historian

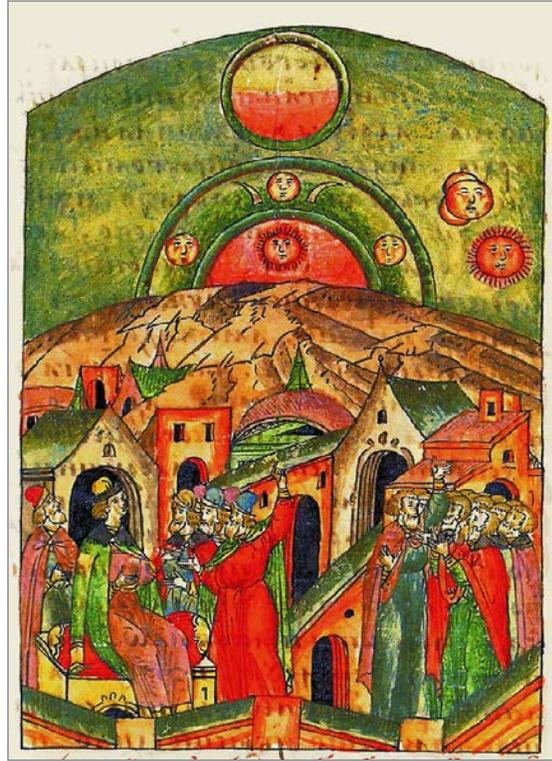
Eclipses and Society Through the Ages (continued)

a clay tablet. Whether they were referring to an eclipse on 3 May 1375 B.C.E. or 5 March 1223 is disputed. These early astronomers wrote that “the Sun was put to shame, and went down in the daytime, with Mars in attendance.”

On 16 April 1178 B.C.E., the shadow of a solar eclipse traversed the eastern Mediterranean region. The character Theoclymenus in Homer’s famous epic *The Odyssey* is believed to be referring to this event when he says that “[t]he Sun has perished out of heaven, and an evil mist has overspread the world.” This eclipse is said to have coincided with Odysseus’s violent return to Ithaca. The eclipse, along with the rest of the story’s setting, took place several centuries before Homer’s time, and it is likely that Homer was never alive for a solar eclipse where he lived.

Lunar eclipses, too, have been the cause of turmoil. After Christopher Columbus became stranded on the island now known as Jamaica in 1503, the indigenous Arawak tribe welcomed him and his crew with food and shelter. But after months of being stranded and with the looming threat of famine, Columbus and his crew incurred the ire of the Arawak people by killing, swindling, and stealing from them. To exert his power, Columbus consulted Johannes Konigsberg’s (also known as Regiomontanus) almanac and learned about an upcoming lunar eclipse. Knowing that the locals were unaware of the event, Columbus told the Arawak chief that Columbus’s Christian god was going to make the Moon “inflamed with wrath” for not supplying him and his crew with adequate provisions. Sure enough, the eclipse occurred, and the red-rimmed Moon terrified the natives. Columbus had convinced them that his god had conjured the event. Just before the eclipse ended, Columbus announced that the natives had been pardoned, after which their fearful cooperation was guaranteed.

Solar eclipses have also influenced works of fiction. American author Mark Twain wrote about a



This page from a 16th-century Russian history, *Facial Chronicle*, depicts a solar eclipse.

19th-century American using his knowledge of eclipse dates when he travels through time back to the 6th century. In *A Connecticut Yankee in King Arthur’s Court*, the protagonist, facing imminent execution, informs King Arthur’s court that he is under the personal protection of the Sun, which will remove itself from Britain unless a pardon is given. The eclipse, listed in the book as 21 June 528, comes on schedule (even though no eclipse is actually believed to have happened on that day). The protagonist is subsequently pardoned by King Arthur and given a high-ranking government position to avoid displeasing the Sun.

Astronomers today have shown more diligence than Hsi and Ho did over 4,000 years ago, and we had plenty of time to prepare. Nonetheless, on 21 August 2017, we were still as starstruck as the Mesopotamians were.

NEWS FROM HEADQUARTERS AND THE CENTERS

NASA HEADQUARTERS

Washington, DC

History Division

By Bill Barry

It has been a busy and tumultuous summer for the Headquarters History Division. In addition to a very full plate of Langley centennial support, a few more *Hidden Figures*-related events, the great eclipse of 2017, the Voyager 40th anniversaries, and other activities, we also said a number of unanticipated good-byes. As you will see in the “From the Chief Historian” column on page 1, Andres Almeida was poached away from us by the Smithsonian Institution. His dedication, creativity, and productivity will be sorely missed. In addition, Barbara Bullock, the program manager at the Headquarters Communications Support Services Center (CSSC), has moved on to new opportunities. Most of you may not realize it, but Barbara and her team at CSSC are the folks who provide the copyediting, layout, and other support we need for our various print and electronic publications (including this one). Barbara’s professionalism and can-do attitude has made our work easier every day. That, combined with her enthusiasm and delightful personality, will lead her to continuing success in whatever she chooses to do—and will leave us feeling the loss. Fortunately, her replacement will be Maxine Aldred, a part of the CSSC team for a while now and an excellent choice to lead the CSSC team ahead. So, we send best wishes to Barbara on her new adventures and congratulations

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OF PARTICULAR NOTE IS THE NEARLY 8 PERCENT INCREASE IN TWITTER FOLLOWERS ON OUR @NASAHISTORY ACCOUNT. WE STARTED THE SUMMER WITH ABOUT 650,000 TWITTER FOLLOWERS AND BROKE THROUGH THE 700,000 MARK AT THE END OF JULY.
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to Maxine for her promotion to program manager. As you may recall from the last newsletter, we were expecting to have the unusual pleasure of an intern working with us through August. Unfortunately, Julian Haddad had a family emergency and had to return to San Diego at the end of July. As this is being written, things are looking better, and we wish Julian and his family all the best. As we expected, our summer intern team of Jordan Carter, Victoria Wegman, and Julian did a spectacular job contributing in a number of ways between late May and the start of August. See, for example, our articles on solar eclipse history by Jordan Carter and Victoria Wegman. This

was originally created as an extended post for the NASA Tumblr account. Of particular note is the nearly 8 percent increase in Twitter followers on our @NASAHISTORY account. We started the summer with about 650,000 Twitter followers and broke through the 700,000 mark at the end of July. This was largely due to the creative and compelling work of our intern team.

Fortunately, we have two great interns lined up for this fall. By the time you read this, Rebecca Charbonneau and Madison Moore will be interning here at NASA Headquarters. Rebecca is a master’s degree candidate in the History of Science, Medicine, and Technology at Oxford University. She’ll be in the DC area to continue her research work on the relationships between U.S. and Soviet astrophysicists during the Cold War while also working with us. Madison is a senior at Hillsdale College majoring in English and participating in her college’s Washington internship program. In an interesting coincidence,

Madison spent part of her summer at Oxford. No, I'm not really being partial to one of my alma maters, but I continue to be impressed by the quality of candidates that are attracted to our internship program. From time to time, some of our former interns will drop by for a visit. This July, summer 2016 intern Christopher Rudeen joined us for lunch from his summer job at the Atomic Heritage Foundation. Chris graduated from Yale this spring and is heading off to Harvard this fall for graduate work. It is always great to hear from members of our extended NASA family. If you were one of our interns and haven't been in touch in a while, we'd love to hear from you. Give us a call or drop us a note (e-mail addresses appear toward the back of the newsletter).

Despite the staffing turmoil, and still limping along without a Chief Archivist, it has been an amazingly productive summer. In addition to getting the Aeronautics and Space Report of the President for Fiscal Year 2016 completed on time (despite some last-minute drama), we also released *Making the Invisible Visible: A History of the Spitzer Infrared Telescope Facility (1971–2003)*, by Renee Rottner, in early June. We also completed and released *Science Advice to NASA: Conflict, Consensus, Partnership, Leadership*, by Joe Alexander, late in the summer. We also ran, thanks largely to the efforts of Andres Almeida, the first NASA History social media "social" in July. This was a two-day event held in two locations focusing on the centennial of Langley Research Center. On 10 July, the social began in Washington at the National Air and Space Museum (NASM). Welcomed by NASM Director Jack Dailey, the social group was treated to an introductory talk by the amazing Tom Crouch and then led on a special tour of the museum by John Anderson. After lunch, the group then had a tour of NASA Headquarters, including visits to the Historical Reference Collection (HRC), NASA TV, and the Space Operations Center—capped off by an impromptu visit by acting Administrator Robert Lightfoot. The next day the group reconvened at Langley Research Center for a day full of amazing tours of the facility and its history. The History Division also supported the Langley Centennial

Symposium (12–14 July); supported NASA's presence at the Experimental Aircraft Association's AirVenture in Oshkosh, Wisconsin (23–30 July); supported the Intrepid Space and Science Festival in New York City (3–4 August), and contributed to supporting NASA's efforts relating to the 21 August eclipse, as well as observations of the 40th anniversaries of the launches of Voyagers 1 and 2. It has been a whirlwind of activity for all of us.

Historical Reference Collection

By Stephen Garber

Archivists Liz Suckow and Colin Fries finished digitizing the NASA budget office's collection of budget estimates. The National Advisory Committee for Aeronautics (NACA) portion of the estimates includes the budget fiscal years (FY) 1956–59. The NASA estimates pick up in FY 1961 and end with FY 1999. They will be available to researchers upon request. Please note that the files are not Section 508-compliant, so we plan to retain them electronically for researchers' use but not yet post them on the Web. For the more current years, the NASA budget Web page has posted the summaries from FY 2000 to the present in born-digital format.

In addition, Colin finished processing the Jesco von Puttkamer collection (2 cubic feet) and the Paul Brockman management files (2 cubic feet). Von Puttkamer moved to Huntsville, Alabama, from Germany in 1962 to work with Wernher von Braun on the Apollo program at Marshall Space Flight Center. After ending his work at Marshall in 1974, he transferred to NASA Headquarters and served as the technical advisor for *Star Trek: The Motion Picture* in 1979. His novelette *The Sleeping God* was included in an anthology of work based on the series; he also worked on the International Space Station Program for many years. In 1963, Paul Brockman became executive assistant and resources management officer for NASA's development of science and applications activities for the Mercury, Gemini, and Apollo missions. He also served for eight years as a management consultant in the Apollo-to-Shuttle management

transition and became NASA's first state, local, and federal intergovernmental relations officer.

In April 2017, Colin and Steve went to the family home of former Headquarters employee Adelbert "Del" Tischler and met with his daughter and acquired 48 boxes (over 50 cubic feet) of his NASA material. Colin and Liz have now unpacked and re-boxed this collection and continue appraising it, removing books and technical documents to determine whether the technical documents are duplicated in the NASA Technical Reports Server (NTRS) or the HRC. Del Tischler was a rocket propulsion specialist who began his career at what was then known as NASA's Lewis (now Glenn) Research Center. For more information about Tischler, see his obituary on p. 30 of the first quarter 2017 issue of *News and Notes* at <https://history.nasa.gov/nltr34-1.pdf>.

Liz is creating an inventory for Johnson Space Center's oral history interviews in electronic formats and editing the hard-copy oral history inventory.

ARMSTRONG FLIGHT RESEARCH CENTER (AFRC)

Edwards Air Force Base, California

By Christian Gelzer

Christian presented a paper to senior leadership at Edwards Air Force Base on the development of reaction control systems, the Lunar Landing Research Vehicle (LLRV), and human factors in spacecraft.

The history office is awaiting cost estimates to come in for digitizing the reference collection; any action after this depends in large measure on funds the Center has for such action.

Additionally, Christian hosted the film crew (director, cinematographer, producer, etc.) of the Neil Armstrong biopic theater release. The group visited the Center and the base, scouting locations and possible sets for filming. He made sure they spent time with the Air Force Flight Test Historical Foundation's



CHRISTIAN HOSTED THE FILM CREW...OF THE NEIL ARMSTRONG BIOPIC THEATER RELEASE. THE GROUP VISITED THE CENTER AND THE BASE, SCOUTING LOCATIONS AND POSSIBLE SETS FOR FILMING.



Museum on the base, where the Center's LLRV is on display, and they had time to discuss use of the museum's X-15 mockup and X-15 sled track nose section, among other items. The group has already visited several other NASA Centers.

GLENN RESEARCH CENTER (GRC)

Cleveland, Ohio

By Anne Mills

Glenn's "Special Projects Laboratory" is scheduled to be demolished this summer as part of the Center's master plan. It began its life as the Jet Propulsion Static Laboratory (JPSSL)—a makeshift facility built quickly to perform secret testing on the earliest jet engines during World War II. It was later modified for the testing of rocket engine components. A public hearing was held on 27 June to afford interested community members the opportunity to learn about the facility and the plans for the demolition, as well as a chance to provide comments on the project. As part of the project, the history of the facility will be documented with input from the Center Historic Preservation Officer and the Ohio State Historic Preservation Office. Below is an excerpt from a brief history of the JPSSL written by Glenn archivist Bob Arrighi (ATS).

The new Jet Propulsion Static Laboratory (JPSSL) was hurriedly built along the fence line between the AERL [Aircraft Engine Research

Laboratory] and Cleveland Municipal Airport that summer. The facility was completed in September. Except for the barbed wire fencing, the 67-foot-wide and 235-foot-long facility was an inconspicuous one-story structure isolated from the main AERL facilities. Inside were two spin pits in which turbojet engines could be operated. Wooden shields were installed to block shrapnel during engine failures.¹

The facility was built to study the performance and control of full-scale jet engines, afterburners, and turbine blades. It was equipped to measure thrust, pressures, temperatures, heat transfer, plastic flow of turbine discs and the cooling, vibration, and rupture of turbine blades.²

The JPSL would grow to include six instrumented turbojet test cells, three spin-pit facilities, and a 500[-]kw heat transfer facility. Its purpose was to study the performance of full-scale turbojet engines, afterburners, and turbine blades. The facility permitted the study of heat transfer, turbine rupture, blade cooling and vibration. There were three control rooms, a manometer room, and three shop areas. The test cells had acoustical housings around their exhaust pipes. Other equipment included a 10-ton crane, [a] 500-horsepower air compressor, three vacuum pumps, a 2-ton cardox tank, three induction heating units, nine large fuel tanks, and basic utility services.³

In September, a heavily guarded truck delivered the General Electric I-A for testing in

the JPSL. Bruce Lundin recalled, “It was to be a highly secret mission, in fact they didn’t call it a jet engine, they called it the Type IA Super Turbocharger, but he would be able to deliver one to us as an engine lab to see what we could do.”⁴

Post-War Turbojets

Virtually every U.S. model of turbojet was studied at the AERL during the mid-1940s. Testing at the lab steadily improved the overall jet engine design and led to specific innovations such as the afterburner. During the ten years between 1943 and 1953, the JPSL was used to study all three generations of GE’s centrifugal engine—the I-A, I-16, and I-40, as well as its first two axial-flow engines—the TG-180 and TG-190.

Lundin recalled General Arnold requesting the AERL researchers to increase the GE engine’s thrust long enough so that the aircraft could take off. “It produced adequate thrust when the airplane was in good high speed forward flight but under more static conditions on the ground it just didn’t have enough thrust to make a good takeoff run. So that gave birth to what we called the Thrust Augmentation Program here at the Center. We tried out several different schemes of temporarily increasing the thrust at whatever the expense of fuel consumption. And one of these schemes turned out to be the right one, which was, of course, the afterburner. And the afterburner was really born here at the Lewis Center in the mid to late 40’s.”⁵

- 1 Dawson, Virginia, *Engines and Innovation: Lewis Laboratory and American Propulsion Technology* (NASA SP-4306: Washington DC, 1991), chapter 3.
- 2 NACA Lewis Flight Propulsion Laboratory, “Major Research Facilities of the Lewis Flight Propulsion Laboratory: Jet Propulsion Static Test Laboratory,” 19 July 1956, Test Facilities Collection, NASA Glenn History Collection, Cleveland, OH.
- 3 “Major Research Facilities of the Lewis Flight Propulsion Laboratory,” 24 July 1956, Test Facilities Collection, NASA Glenn History Office, Cleveland, OH.
- 4 Lundin, Bruce, *This Way Up*.
- 5 Ibid.

With the foundation of NASA in October 1958 the JPSL soon became used for a variety of space[-]related test rigs. A Cryogenic Insulation Test Tank, Thermal Fatigue Rig, and Gamma Ray Radiation Pool were installed in 1959. The JPSL also was used in support of the Zero Power Reactor in the nearby Materials and Stress Building, Hypervelocity Vacuum Range in 1961, High-temperature Erosion Corrosion Facility [mid-1960s]. By early 1963 the facility was renamed the Special Projects Laboratory. It included a Vacuum Induction Melting and Casting Facility.

In the mid 1960s the facility returned to turbojet studies. In 1968 and 1969 Brayton Engine Assembly was performed. The J-85 returned in the early 1970s on an Experimental Turbojet Stand D.[.] and various burner rigs were used throughout the 1970s. By the mid-1970s the JPSL was used for atmospheric testing of J85 engines, erosion and corrosion of engine components using high-speed exhaust gases up to Mach 1, vacuum and atmospheric oxidation studies, thermal shock from 0 to 2500 degrees Fahrenheit, reentry studies at 6000 degrees Fahrenheit and 10-6 Torr, ion sputtering, and refractory coating studies.⁶

In 1987 Lewis and the Defense Contract Administrative Services Region (DCASR) created a classroom in the [Special Projects Laboratory] SPL to teach soldering, surface treatment of metals, statistical sampling, welding, automatic test equipment, metallurgy, and nondestructive testing. It was part of a larger effort by the Training and Development Branch to expand the center's training efforts.⁷

JOHNSON SPACE CENTER (JSC)

Houston, Texas

By John Uri

The JSC History Office was happy to participate in the NASA History Program Annual Review at the Jet Propulsion Laboratory (JPL) in Pasadena, California, and especially want to thank our hosts for the great venue and excellent extracurricular activities. For me, it was great to finally meet everyone from around the Agency. We have a hard act to follow as we look forward to hosting next year's Annual Review.

We continue to expand our extensive oral history collection by conducting numerous interviews for several customers: the NASA Headquarters History Division, the JSC Knowledge Management Office, and the NASA Headquarters Science Mission Directorate (SMD). Jennifer Ross-Nazzal, Sandra Johnson, and Rebecca Wright traveled to Ames Research Center (ARC), JPL, Goddard Space Flight Center (GSFC), and NASA Headquarters to conduct multiple interviews, and they also continue to conduct oral histories here at JSC. Among the many individuals interviewed were former NASA Administrator Charlie Bolden, Associate Administrator for Human Exploration and Operations Bill Gerstenmaier, and JSC Center Director Ellen Ochoa, just to name a few. The transcripts of the interviews are being processed and will be uploaded to the JSC History Portal once the subjects have approved them for release.

On 13 June 2017, *TIME* science editor and senior writer Jeffrey Kluger gave a talk at JSC about his latest book, *Apollo 8: The Thrilling Story of the First Mission to the Moon*, published by Henry Holt and Co. Kluger, coauthor with astronaut Jim Lovell of the bestseller *Lost Moon: The Perilous Voyage of Apollo 13*, provided some interesting insights into the decision-making process that led to Apollo 8's circling of the Moon in December 1968. In his comments, Kluger publicly

6 NASA Lewis Research Center, Facilities Survey, 1975, Glenn History Program, Facilities Collection.

7 "Training and Development Branch Offers a Wealth of Career Growth Opportunities," *Lewis News* (26 March 1987).



Author Jeffrey Kluger discusses his new book on Apollo 8 at JSC in June. (Photo credit: NASA JSC/ David DeHoyos)

thanked the JSC History Office for the great help provided by our resources, in particular highlighting the usefulness of the more than 1,000 transcripts of oral histories that can be found at the JSC History Portal (<https://www.jsc.nasa.gov/history>). Similar words of appreciation are in the author's note in *Apollo 8*, summarized as follows: "It is a gift to history that this project exists." In private discussions during the book signing, Kluger reiterated these sentiments, emphasizing the usefulness of the JSC History Office to his research and praising the ease of use of the History Portal Web site and the wealth of information that can be found there.

Jennifer Ross-Nazzal was invited to participate in a panel discussion entitled *The History of Flight, A Century of Finding Practical Solutions* at the Langley Centennial Symposium, held in Hampton, Virginia, from 12 to 14 July. The panel, moderated by ARC Historian Glenn Bugos, discussed tools for interpreting the major themes in the history of NASA Langley Research Center (LaRC) and suggested major inflection points as the people of Langley historically confronted new challenges. Jennifer described how LaRC had provided the essential building blocks on which the Manned Spacecraft Center, now Johnson Space Center, was built.

John Uri attended the American Productivity & Quality Center's (APQC) annual Knowledge Management Conference, held 19–20 April in Houston, with his manager, JSC Chief Knowledge Officer Jim Rostohar. The APQC is the world's foremost authority in knowledge management, and the conference served as a chance to connect with over 350 knowledge management practitioners in academia, business, and government, sharing lessons learned and discussing how new ideas and technologies are transforming the field.

JSC History Office personnel are participating in a series of Webinars sponsored by the American Association of State and Local History (AASLH) dealing with social media for museums and historic places. The three Webinars held in June and July focused on the use of Facebook, Twitter, and Instagram as tools to help history organizations increase their social media footprint. We will use the information gleaned from these Webinars to help us decide on a social media plan for the JSC History Office. Another AASLH Webinar in August on the topic of how historic places can commemorate anniversaries will provide useful information as NASA and JSC plan for upcoming significant anniversaries in 2017, 2018, and 2019.

On 5 June, we welcomed our summer intern, Carlos Amaya, a rising sophomore majoring in computer science at the University of Houston. While we shared Carlos's talents with others in the Knowledge Management Office, it was good to have an intern once again. Carlos's background was useful as he helped us to evaluate the JSC History Portal Web site to upgrade the look without altering the content or the usability. The History Office has not been able to update the design since the Portal first went online in 2000. Carlos was with us until early August.

MARSHALL SPACE FLIGHT CENTER (MSFC)

Huntsville, Alabama

By Brian Odom

The Marshall History Office and Archives is currently hosting two interns. One of them, Jessica Brodt, hails from Huntsville, Alabama, and is a recent graduate of the University of Alabama in Huntsville (UAH), where she earned a master of arts in history. This fall, she will begin working toward her Ph.D. in history at the University of Alabama, specializing in United States history before 1877, specifically regarding antebellum slavery in southeastern Native American nations. Joining Jessica in the office is Mary Anderson “Andie” Brown, a Madison, Alabama, resident. Andie is a rising junior at Rhodes College in Memphis, Tennessee, where she is a public history major and religious studies minor.

During their summer at Marshall, these interns are documenting the history of International Space Station (ISS) technologies, including the Environmental Control and Life Support System (ECLSS), the EXPedite the PROcessing of Experiments for Space Station (EXPRESS) Racks, the Microgravity Science Glovebox (MSG), and the Window Observational Research Facility (WORF). The majority of this work is being accomplished through oral history interviews and research that will be featured on the Marshall History Office’s Web page.

Over the past few months, most of the archival work at Marshall has involved transcribing several hours of audio from oral history interviews. Most of these transcriptions relate to propulsion development at Marshall since Challenger. In addition to transcribing these interviews, staff members processed two new collections and an addition to an existing collection. The largest of the three was the Dr. Jerry L. Weinberg Papers, a collection that totals over 30 linear feet of material. Dr. Weinberg is an astrophysicist who has been a Principal Investigator and Co-Principal Investigator of both crewed and noncrewed space experiments since 1968. These

experiments include Pioneer 10 and 11, the zodiacal light experiment on Skylab, Voyagers 1 and 2, the International Solar Polar Mission, STS-3/Pathfinder, the European Space Agency’s Giotto mission to encounter and study Halley’s comet during its 1986 “return visit,” the Long Duration Exposure Facility (LDEF), and the Clementine Interstage experiment to measure interplanetary dust and space debris in Earth’s vicinity.

STENNIS SPACE CENTER (SSC)

Stennis Space Center, Mississippi

By Jessica Herr

A Look Back at Stennis in the 1970s

In 1973, what was then called the Mississippi Test Facility (MTF) had a total of 1,127 employees. After the Apollo program ended, workforces were cut as the facility faced challenging times. However, an engine test project was on the horizon—the Space Shuttle. The Space Shuttle was designed as a reusable vehicle to carry humans to low-Earth orbit following in the footsteps of the Apollo program.

MTF jumped at the chance to test the engines that would power the Shuttle fleet. An effort to have Space Shuttle Main Engines (SSMEs) manufactured at Michoud Assembly Facility (MAF) in nearby New Orleans and then tested at MTF went into motion. One of the companies entering bids for the project was the Lockheed Propulsion Company of California, which embraced the idea of using MAF and MTF to perform the work. Other companies putting in bids for the work were Thiokol Chemical Corporation of Brigham City, Utah; Aerojet Solid Propulsion Company of Sacramento, California; and United Technology Center of Sunnyvale, California.

With bids submitted, a delegation of elected officials, community leaders, and business people from Louisiana and Mississippi began lobbying for the work to come to their states. In late 1973, the award was given to Thiokol Chemical Company. The local community around MAF and MTF were angered by

the announcement since just a few years earlier, NASA had named MTF “the Nation’s foremost propulsion test site.”

The announcement set off a series of events that would shape the future of MTF: the protest of the Solid Rocket Motor contract award to Thiokol; calls for “full utilization of MTF” by U.S. Senator John C. Stennis, U.S. Representative Trent Lott, and other Mississippi and Louisiana officials; and a campaign for renaming the facility and establishing it as an independent NASA installation no longer under the direction of Marshall Space Flight Center) in Huntsville, Alabama.

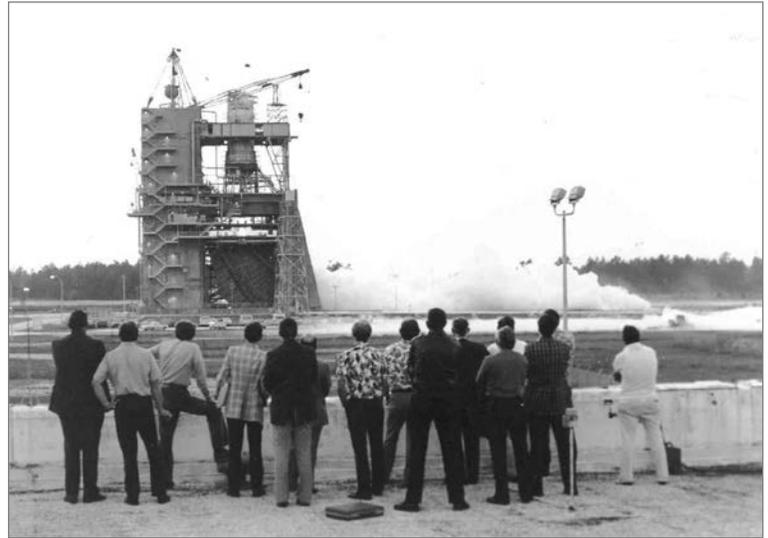
Senator Stennis spearheaded the movement, and on 14 June 1974, the Mississippi Test Facility was renamed the National Space Technology Laboratories (NSTL) and became an independent installation of NASA, reporting to NASA Headquarters. Stennis said that the “efforts to increase the use of NSTL by NASA and other Federal agencies [would] now be more successful than ever before.” Site Director Jackson Balch was quite pleased with the changes, saying that “it will be kind of nice to be a member of the club.”

UPCOMING MEETINGS

The International Astronautical Congress will be held **25–29 September 2017** in Adelaide, Australia. Visit <http://www.iafastro.org/events/iaaciac-2017> for details.

The annual meeting for the Society of the History of Technology (SHOT) will be held **26–29 October 2017** in Philadelphia, Pennsylvania. Visit <https://www.historyoftechnology.org/annual-meeting/2017-shot-annual-meeting-26-29-october-philadelphia> for more details.

The European Space Agency Space History Conference will be held **23–24 November 2017** in Padua, Italy. Visit <http://esaconferencebureau.com/list-of-events> for details.



Onlookers watch the first SSME test on the A-1 Test Stand at Stennis Space Center on 19 May 1975.

Just a year later, on 24 June 1975, a brief but very important event occurred at the newly independent site: the first ignition test of an SSME. It lasted just a second, but it marked the return to propulsion testing for NSTL and opened the door for testing projects to follow, including the current testing of engines that eventually will carry humans to deep space.

The 2018 AIAA SciTech Forum will be held **8–12 January 2018** in Orlando, Florida. Visit <https://scitech.aiaa.org> for details.

“To Boldly Preserve: Archiving for the Next Half-Century of Space Flight” will be held **1–2 March 2018** at the Center for the History of Physics at the American Institute of Physics in College Park, Maryland. Contact Jonathan Coopersmith at j-coopersmith@tamu.edu, Angelina Callahan at angelina.callahan@nrl.navy.mil, or Greg Good at ggood@aip.org for details. You may also visit <https://go.nasa.gov/2v3DUF8>.

OTHER AEROSPACE HISTORY NEWS

SMITHSONIAN NATIONAL AIR AND SPACE MUSEUM

By Valerie Neal, Curator and Chair, Space History Department

This past quarter, space historians at the National Air and Space Museum (NASM) published works, presented at conferences and other venues, and also gave a variety of short presentations via Facebook Live and Periscope.

Publications

Yale University Press released Valerie Neal's book, *Spaceflight in the Shuttle Era and Beyond*, which was largely researched in the historical reference collections at NASA Headquarters and Johnson Space Center. Paul Ceruzzi published "Aerospace Needs, Microelectronics, and the Quest for Reliability: 1962–1975" in *Proceedings of the IEEE*, vol. 105, no. 7 (16 June 2017).

Conference and Scholarly Presentations

NASM curators spoke on a variety of topics derived from their research at several conferences during the spring. Cathy Lewis presented a paper entitled "The Soviet Aesthetics of Flight in Space Culture and Aeroflot Advertising" at the joint meeting of the Southern Council on Slavic Studies and the Association of Women in Slavic Studies. Teasel Muir-Harmony presented a paper titled "Projecting American Science Abroad: U.S. Science-Themed Propaganda Films, 1950s–1970s" at the Society for Historians of American Foreign Relations. Margaret Weitekamp participated in a roundtable discussion panel at the National Council of Public History's annual meeting, and Tom Lassman presented at the Society for History in the Federal Government's annual meeting. Martin Collins lectured on the topic of globalization to undergraduate and graduate classes at New York University, and Michael Neufeld gave two lectures on Wernher von Braun at the Kansas Cosmosphere in Hutchinson, Kansas.

Other Public Talks

Proving that historians sometimes have cool opportunities to speak in unexpected places with people outside our profession, Matthew Shindell spoke about the Moon at the Awesome Con pop culture conference in Washington, DC, where he also interviewed David Tennant, one of the actors who has played the character called the Doctor in the long-running TV show *Doctor Who*, before a standing-room-only audience of at least 5,000 fans. Shindell also spoke at the American Film Institute (AFI) Documentary Film Festival (AFIDOCs), moderating a discussion with director Emer Reynolds after a screening of *The Farthest*, his new documentary film about NASA's Voyager mission.

Jennifer Levasseur interviewed Jeffrey Kluger about his new book, *Apollo 8: The Thrilling First Mission to the Moon*, during a public program at NASM and also interviewed former astronaut and National Oceanic and Atmospheric Administration (NOAA) Administrator Kathryn Sullivan for a "Celebrating Earth Day" program. Margaret Weitekamp also had a unique appearance with journalist Miles O'Brien and other panelists in a conversation about the CNN *Soundtracks: Songs That Defined History* episode "Moon Landing" after a screening in the museum's Lockheed Martin IMAX Theater.

Also Newsworthy

David DeVorkin is a board member of the Lowell Observatory in Flagstaff, Arizona. He advises the organization as considers major outreach expansion and reviews the status of the observatory's collections, exhibits, and restoration projects. Mars expert John Grant of NASM's Center for Earth and Planetary Studies received the G. K. Gilbert Award from the Planetary Geology Division of the Geological Society of America. Lindbergh Chair in Aerospace History Kathryn Sullivan talked about her book in progress, *Handprints on Hubble: The Untold Story of Servicing the*

Hubble Space Telescope, at an especially well-attended session of the museum's Contemporary History Seminar. Rainer Weiss (Massachusetts Institute of Technology) gave the annual John H. Bahcall Lecture, focusing on the Laser Interferometer Gravitational-Wave Observatory (LIGO) and gravitational waves. And finally, the museum completed the 2017 Exploring Space Lecture series with fascinating talks by Scott Bolton (Southwest Research Institute) on the Juno mission to Jupiter, Scott Brown (California Institute of Technology, or Caltech) on Planet Nine, and Heather Knutson (Caltech) on exoplanets; all sessions attracted a full house.

CALL FOR PAPERS

"To Boldly Preserve: Archiving for the Next Half-Century of Space Flight"

Center for the History of Physics at the American Institute of Physics

College Park, Maryland
1–2 March 2018

Paper, Presentation, and Roundtable Proposals Due 1 October 2017

Preserving the history of space exploration faces unprecedented challenges and opportunities in this digital, big-data era. New forms of electronic communication and data, including oral histories and social media, are changing the nature of historical records and increasing their ease of collection.

Even as early generations of researchers, engineers, administrators, and users retire, the number of countries, organizations, businesses, and other nongovernmental actors involved in space is sharply expanding. Relying on the National Archives and Records Administration (NARA) for U.S. government records management, while still essential, is increasingly inadequate. Furthermore, most of humanity experiences space technology either as something useful (e.g., communications and weather satellites) or as a source of imagination and enthusiasm. How do we

document and archive the activities of hundreds of actors in space? How do we archive the experience of users? How do we archive imagination?

The Internet and widespread use of digital media have spurred tremendous popular interest in do-it-yourself oral history and other emerging methods for archiving among people not classically trained as historians, archivists, or records managers. Done well, these bottom-up approaches could greatly expand the availability of historical records—especially by groups, organizations, and individuals not fully captured by government archives.

To examine critical issues in creating, collecting, preserving, and accessing space archives worldwide, this conference will bring the historical and archival communities together with space industry, records management, digital humanities, and library media management professionals. The conference will 1) explore data-management strategies and toolboxes of exemplary best practices; 2) provide a variety of archival models for oral histories, along with digital, print, and less conventional collections management (such as software and artifacts); 3) disseminate these strategies and practices to space stakeholders; and 4) encourage underrepresented minorities and communities to create and archive their contributions to space history.

To encourage discussion, we will pre-circulate conference papers to registrants and post them to the conference Web site. An edited volume based on the conference will be published, as well as guides of best practices.

Possible topics include, but are not limited to, the following:

- Examining the first half century of space archives
- Examining contemporary and future issues in space archives
- Archiving space-based business and operations
- Collecting and contextualizing social media, hardware, and software

- Integrating do-it-yourself history with archives
- Addressing legal concerns: intellectual property, International Traffic in Arms Regulations (ITAR), classification, nondisclosure agreements, records management, and archiving by lawyers
- Reviewing contract history, including templates for a successful project
- Getting buy-in from individuals and organizations
- Reaching underrepresented people and areas
- Archiving the experience of users
- Finding archival partners and solutions
- Ensuring access through data management and compliance with the Americans with Disabilities Act (ADA)
- Disseminating and diffusing best practices

While focused on space history, this National Science Foundation (NSF)–funded conference aims to have a much larger impact by providing practical and policy recommendations. This conference addresses issues faced by all areas of Science, Technology, and Society (STS) studies and history—encouraging high-quality “history from below,” using new electronic technologies, preserving a wide range of materials, and educating a new generation of stakeholders.

The workshop will be conducted in English. The organizers can assist with travel and accommodation expenses for presenters. Please send a one-page abstract and one-page résumé as one PDF file to toboldlypreserve@gmail.com by 1 October 2017. Decisions about acceptance will be made by 1 November 2017. For more information, contact Jonathan Coopersmith (j-coopersmith@tamu.edu), Angelina Callahan (angelina.callahan@nrl.navy.mil), or Greg Good (ggood@aip.org).

CALL FOR PAPERS

2017 Sacknoff Prize for Space History

About the Prize

Awarded since 2011, the prize is designed to encourage research and writing by university students in the area of space history.

Eligibility

At the time of submittal, students must be enrolled at educational institutions (undergraduate or graduate) and working toward a degree. Papers already published or scheduled for publication in another journal will *not* be accepted.

Deadline

Submissions must be received by **14 November 2017**.

Criteria for Submission

Manuscripts should not exceed 10,000 words and should be typed and in English. Submissions should emphasize in-depth research, with adequate citations of the sources utilized. Originality of ideas is important. Diagrams, graphs, images, and/or photographs may be included.

Although works must be historical in character, they can draw on disciplines other than history, e.g., cultural studies, literature, communications, economics, engineering, science, etc.

Possible subjects include, but are not limited to, comparative or international studies of the history of spaceflight; historical aspects of space companies and their leaders; regulation of the space business; financial and economic aspects of the space industry; the social effects of spaceflight; space technology development; the space environment; and space systems design, engineering, and safety.

Submission Instructions

- Submit materials electronically; files must be compatible with Word or PDF format if not in one of those formats already.
- Include a cover letter with the student’s street address, e-mail address, school, program, advisor, and stage in studies.
- Send entries to scott@spacehistory101.com.

For additional information, visit <http://www.spacehistory101.com/prize>.

RECENT PUBLICATIONS

Compiled by Chris Gamble

Women Spacefarers—Sixty Different Paths to Orbit, by Umberto Cavallaro (Springer-Praxis, January 2017). This book tells the stories of the valiant women who broke down barriers to join the space program. Beginning with the orbital flight of USSR cosmonaut Valentina Tereshkova in 1963, the author contextualizes their accomplishments in light of the political and cultural climate, from the Cold War in the background to the changing status of women in society at large during the 1970s.

Satellite: Innovation in Orbit, by Doug Millard (Reaktion Books, February 2017). Millard shows how the Cold War space race helped make the earliest satellites—ones like Sputnik, Telstar, and Early Bird—household names. The author describes how they evolved into cultural signifiers that represented not only our scientific capabilities but also our capacity for imagination and our ability to broaden the scope of our vision to the farthest reaches of space.

Spaceports Around the World, A Global Growth Industry, by Erik Seedhouse, SpringerBriefs in Space Development series (Springer, January 2017). This publication presents a concise description of the existing spaceport market, the technologies being tested and developed, and the private companies that are making them possible.

Canada's Space Program—From Black Brant to the International Space Station, by Andrew Godefroy (Springer-Praxis, May 2017). This work details Canada's space efforts from its origins in the 1940s through its participation in the International Space Station today. It attempts to shed a clearer light on the progress made by the Canadian Space Agency thus far, as well as its ambitious goals.

Space Physiology and Medicine: From Evidence to Practice, 4th ed., edited by Arnauld E. Nicogossian, Richard S. Williams, Carolyn L. Huntoon, Charles

R. Doarn, James D. Polk, and Victor S. Schneider (Springer, December 2016). This fourth edition of *Space Physiology and Medicine* provides summaries of the current knowledge base in space medicine and serves as a source of information on the space environment. Additionally, there is online material available for each chapter, featuring overviews and self-study questions.

Conceptual Shape Optimization of Entry Vehicles: Applied to Capsules and Winged Fuselage Vehicles, by Dominic Dirx and Erwin Mooij (Springer, December 2016). This book covers the parameterization of entry capsules, including Apollo capsules and planetary probes, and winged entry vehicles such as the Space Shuttle and lifting bodies. The aerodynamic modeling is based on a variety of panel methods that take shadowing into account, and it has been validated with flight and wind tunnel data from Apollo and the Space Shuttle. The shape optimization is combined with constrained trajectory analysis, and the multi-objective approach provides the engineer with a Pareto front of optimal shapes.

The Apollo Lunar Samples: Collection Analysis and Results, by Anthony Young, SpringerBriefs in Space Development series (Springer, March 2017). This book focuses on the specific mission planning for lunar sample collection, the equipment used, and the analysis and findings concerning the samples at the former Lunar Receiving Laboratory in Houston, Texas. Young documents the collection of Apollo samples.

NASA/ESA/ASI Cassini-Huygens: 1997 Onwards—Cassini Orbiter, Huygens Probe and Future Exploration Concepts (Owners' Workshop Manual), by Ralph Lorenz (Haynes Publishing, April 2017). This book provides an insight into the technology, mission planning, and operation of the spacecraft designed to study Saturn's moon Titan and other parts of the Saturnian system.



In this still from the short film *Cassini's Grand Finale*, the spacecraft is shown diving between Saturn and the planet's innermost ring. (Photo credit: NASA/JPL-Caltech)

Spaceflight in the Shuttle Era and Beyond: Redefining Humanity's Purpose in Space, by Valerie Neal (Yale University Press, June 2017). The author, who has spent much of her career examining the Space Shuttle Program, uses this iconic vehicle to question over four decades' worth of thinking about, and struggling with, the meaning of human spaceflight. She examines the ideas, images, and icons that emerged as NASA, Congress, journalists, and others sought to communicate rationales for, or critiques of, the Space Shuttle missions.

NASA Mercury—1956 to 1963 (All Models): An Insight into the Design and Engineering of Project Mercury—America's First Manned Space Programme (Owners' Workshop Manual), by David Baker (Haynes Publishing, June 2017). The book provides coverage of the design, engineering, development, and flight operations of NASA's Mercury spacecraft. In addition to several uncrewed tests that supported two piloted ballistic suborbital flights in 1961 and four piloted orbital flights in 1962 and 1963, the Mercury program bridged the gap between the hypersonic X-15 and the two-person Gemini spacecraft, which in turn led to the Apollo spacecraft. This book completes the Haynes Workshop manual series of U.S. and Russian piloted space vehicles.

Exploring the Martian Moons: A Manned Mission to the Orbits of Phobos and Deimos, by Dutch von Ehrenfried (Springer-Praxis, April 2017). This book explores the once-popular idea of "Flexible Path" in terms of Mars, a strategy that would focus on a crewed orbital mission to Mars's moons. While currently still not the most popular idea, this mission would take advantage of the operational, scientific, and engineering lessons to be learned from going to Mars's moons first. The author argues that this experience would enhance the probability of a safe and successful Mars landing by NASA at a later date and lays out the best way to approach an orbital mission in great detail.

The Long Space Age: The Economic Origins of Space Exploration from Colonial America to the Cold War, by Alexander MacDonald (Yale University Press, April 2017). An economic historian argues that privately funded space exploration is not a new development, but a trend beginning with the astronomical observatories of the 19th century. The book examines the economic history of American space exploration and spaceflight, from early astronomical observatories to the International Space Station, and argues that the contemporary rise of private-sector efforts is the reemergence of a long-running trend, not a new phenomenon.

World's Fastest Single-Engine Jet Aircraft: The Story of Convair's F-106 Delta Dart Interceptor, by Colonel Doug Barbier, U.S. Air Force (Ret.) (Specialty Press, April 2017). This book provides a look at the sixth member of the U.S. Air Force "Century Series" family of supersonic fighters. From initial concept through early flight tests and development and into operational service, every facet of the F-106's career is examined and explained.

Zeppelin Hindenburg: An Illustrated History of LZ-129, by Dan Grossman, Cheryl Ganz, and Patrick Russell (The History Press, May 2017). The LZ-129 Hindenburg was intended as the first of many German airships built for passenger, freight, and mail service between Europe and North and South America. Although most famous for its fiery crash on 6 May

1937, the Hindenburg had completed 62 successful flights before the ship's hydrogen lifting gas ignited while landing at Lakehurst, New Jersey. Here, three world-renowned Hindenburg experts have collaborated to create a photographic history of the zeppelin. Gripping historical research is combined with a vivid selection of rare ephemera, rare photographs, and a fold-out section showcasing the ship's plans.

Mars: The Pristine Beauty of the Red Planet, by Alfred S. McEwen, Candice Joy Hansen-Koharcheck, and Ari Espinoza (University of Arizona Press, May 2017). The High Resolution Imaging Science Experiment (HiRISE) is the most powerful camera ever sent to orbit another planet, showing us Mars in astonishing detail. This volume, produced from an active NASA mission, features a published collection of HiRISE high-resolution color images with explanatory captions in 24 languages.

Hawker P.1127, Kestrel and Harrier: Developing the World's First Jet V/STOL Combat Aircraft, by Tony Buttler (The History Press, June 2017). Using original documents, Buttler presents an analysis of the creation and refinement of the world's first successful vertical and/or short takeoff and landing (V/STOL) combat aircraft.

Northern Arizona Space Training (Images of America), by Kevin Schindler and William Sheehan (Arcadia Publishing, June 2017). During the 1960s and early 1970s, northern Arizona played a critical role in fulfilling President Kennedy's bold challenge of sending humans to the Moon. From the rocky depths of the Grand Canyon to lofty cosmic views from Flagstaff's dark skies, northern Arizona was ideal for activities ranging from Moon buggy testing and geology training to lunar mapping and mission simulation. Every astronaut who walked on the Moon, from Neil Armstrong to Gene Cernan, prepared for his journey in northern Arizona, and all used maps created by Flagstaff artists to navigate their way around the lunar surface. This book captures the spirit of these pioneers with stunning images from NASA, the U.S. Geological Survey, and others.

Chasing Space: An Astronaut's Story of Grit, Grace, and Second Chances, by Leland Melvin (Amistad, May 2017). Melvin, a former NASA astronaut and professional athlete, offers an examination of the intersecting roles of community, determination, and grace that align to shape our opportunities and outcomes.

Luftwaffe Emergency Fighters: Blohm & Voss BVP.212, Heinkel P.1087C, Junkers EF 128, Messerschmitt P.1101, Focke-Wulf Ta 183 and Henschel Hs P.135, by Robert Forsyth, X-Planes series (Osprey Publishing, June 2017). In late 1944, the German Air Ministry organized what it called an "Emergency Fighter Competition" intended to produce designs for quick-to-build yet technically and tactically effective jet fighter aircraft capable of tackling the anticipated arrival of the B-29 Superfortress over Europe, as well as the British Mosquito and U.S. P-38 Lightning, which were appearing in ever greater numbers. Using three-view illustrations of each prototype along with full-color artwork, aviation expert Forsyth traces the history of the extraordinary aircraft of the Emergency Fighter Competition.

4th Rock from the Sun: The Story of Mars, by Nicky Jenner (Bloomsbury Sigma, June 2017). The book examines Mars's attributes and impact on our cultures, its environmental science and geology, and its potential for human colonization.

Dream Missions—Space Colonies, Nuclear Spacecraft, and Other Possibilities, by Michel van Pelt (Springer-Praxis, June 2017). This book takes the reader on a journey through the history of the large and complex space missions that never happened. Each project described in this book says something about the dreams and expectations of its time. Their demises were often linked to important changes in the cultural, political, and social state of the world.

OBITUARY

CURTIS PEBBLES: AFRC AEROSPACE HISTORIAN AND PROMINENT UFO SKEPTIC

NASA and the aerospace history community are deeply saddened by the loss of our good friend, Curtis Peebles, who died at the age of 62 on Sunday, 25 June 2017. Peebles, an energetic and longtime contributor to NASA historical scholarship, had suffered from declining health for the last few years. He was the author of a dozen books on topics that ranged from the validity of UFO sightings to Cold War aerospace history. He wrote several books in the NASA History Series, including collections of oral histories from what is now Armstrong Flight Research Center and, with Ken Iliff, *From Runway to Orbit: Reflections of a NASA Engineer* (NASA SP 2004-4109).

Peebles graduated from California State University, Long Beach, in 1985 with a bachelor of arts in history, and he had been working as a freelance writer at Analytical Services & Materials, Inc., since 1977. Having written more than 40 articles, he was a frequent contributor to *Space Education Magazine* and *Spaceflight Magazine*. *Watch the Skies! A Chronicle of the Flying Saucer Myth*, published by the Smithsonian



Curtis Peebles is shown above.

Press in 1994, cemented Peebles as a prominent UFO skeptic. Following its publication, he was featured in documentaries by both A&E Network and the History Channel. Peebles's 1997 work, *The Corona Project: America's First Spy Satellites*, documents the United States' first reconnaissance satellite program, known as the Corona project. His last published work, *Probing the Sky: Selected NACA Research Airplanes and Their Contributions to Flight*, was finalized by noted aerospace historian Dick Hallion and published as part of the NASA Aeronautics Book Series in 2014.

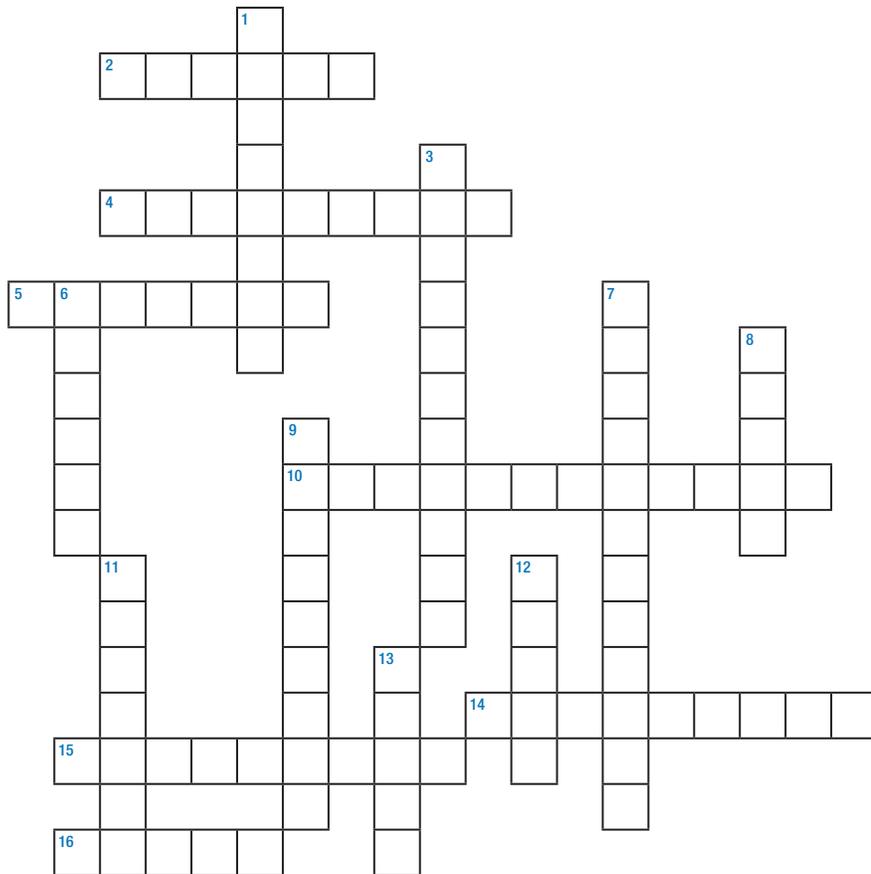
Beginning in November 2000, Peebles began working at what was then the NASA Dryden Flight Research Center. He was both a Fellow of the British Interplanetary Society and a member of the Flight Test Historical Foundation. He will be greatly missed by his friends and colleagues here at NASA.



HE WAS THE AUTHOR OF A DOZEN BOOKS ON TOPICS THAT RANGED FROM THE VALIDITY OF UFO SIGHTINGS TO COLD WAR AEROSPACE HISTORY. HE WROTE SEVERAL BOOKS IN THE NASA HISTORY SERIES, INCLUDING COLLECTIONS OF ORAL HISTORIES FROM WHAT IS NOW ARMSTRONG FLIGHT RESEARCH CENTER.



VOYAGER CROSSWORD



Across

2. The last name of the U.S. President during the Voyager launches.
4. The month of the Voyager 1 launch
5. The name of the program of which Voyager was originally going to be part; it had already launched several spacecraft.
10. The kind of space into which Voyager 1 made its historic entry in August 2012.
14. The element whose radioactive isotopes power the generators on board the Voyager spacecraft.
15. The name of the Space Shuttle orbiter that launched the Hubble Space Telescope, which is mapping the route of both Voyagers.
16. The last name of the committee chair who selected images and sounds for the Golden Record.

Down

1. The series whose first movie includes a fictitious Voyager 6 probe that has gone rogue.
3. The outermost layer of the heliosphere, where the solar wind is slowed by the pressure of the interstellar medium.
6. The month of the Voyager 2 launch.
7. The type of device on the Voyagers that measures magnetic fields.
8. The launch rocket.
9. The number of languages in which the Golden Record contains greetings.
11. The U.S. state from which both Voyager probes launched.
12. A type of nonhuman animal whose voice recording was included on the Golden Record.
13. The number of years the Voyagers have been in space

Answers on page 22

FIVE ECLIPSES IN NASA HISTORY

By Victoria Wegman, NASA History Division Intern

On Monday, 21 August 2017, millions of people across North America were given the opportunity to witness an eclipse of the Sun. Anyone within the path of totality was able to see one of nature's most awe-inspiring sights: a total solar eclipse. Along this path, the Moon completely covered the Sun, revealing the Sun's tenuous atmosphere, the corona. The path of totality stretched from Salem, Oregon, to Charleston, South Carolina. Observers outside this path were still able to see a partial solar eclipse, in which the Moon covered part of the Sun's disk.

Total solar eclipses are a rare chance to study the Sun and Earth in unique ways. During the total eclipse, scientists can observe the faintest regions of the Sun and study the Sun's effects on Earth's upper atmosphere. We have been using eclipses to learn more about our solar system for more than 50 years. Let us take a look back at five notable eclipses of the past five decades.

1. 30 MAY 1965

A total eclipse passed over the Pacific Ocean 198 kilometers (123 miles) from the northern tip of New Zealand to Peru on 30 May 1965. Totality—when the Moon blocks all of the Sun's face—lasted for 5 minutes and 15 seconds at peak, making this the third-longest solar eclipse totality in the 20th century. Mexico and parts of the Southwestern United States saw a partial solar eclipse, meaning that the Moon blocked only part of the Sun. NASA sent scientists to the path of totality for this eclipse, stationing researchers on South Pacific islands to study the response of the upper atmosphere and ionosphere to the eclipse. Strange things happen when Earth abruptly loses sunlight! Additionally, our high-flying jets, scientific balloons, and sounding rockets—suborbital research rockets that fly and collect data for only a few minutes—recorded data in different parts of the atmosphere. A Convair 990 research jet chased the Moon's shadow as

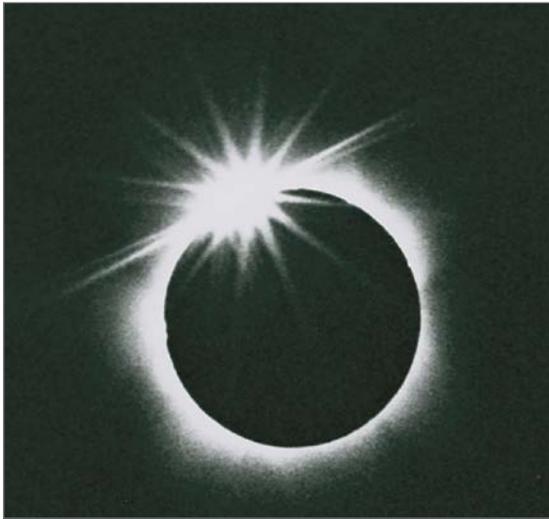


Sheldon M. Smith is shown here with an eclipse camera on NASA's 1965 Solar Eclipse Expedition.

it crossed Earth's surface, extending totality to more than 9 minutes, giving scientists aboard more time to collect data. A NASA-funded team of researchers used the same tactic with two jets to extend totality to more than 7 minutes on 21 August 2017, up from the 2 minutes and 40 seconds observable on the ground. See <https://www.nasa.gov/feature/goddard/2017/chasing-the-total-solar-eclipse-from-nasa-s-wb-57f-jets> for more details.

2. 7 MARCH 1970

During the 7 March 1970 total solar eclipse, the Space Electric Propulsion Test, or SERT, mission temporarily shut down because of the lack of sunlight. The experimental spacecraft was unable to restart for two days. On Earth, the total eclipse lasted for 3 minutes and 28 seconds at maximum and was visible in North America and the northwestern part of South America. This was the first time a solar eclipse passed over a NASA Center. There was a large gathering at Wallops



The total solar eclipse of 7 March 1970 ran along the East Coast of the United States. (Photo credit: NASA)

Station in Virginia—now Wallops Flight Facility—to watch the eclipse. About 13,000 spectators were joined by members of Congress and NASA Deputy Associate Administrator Wernher von Braun on the shores of the Atlantic Ocean to enjoy the phenomenon.

3. 10 JULY 1972

Two years later, North America saw another total solar eclipse. This time, totality lasted 2 minutes and 36 seconds at the longest. A pair of scientists from Marshall Space Flight Center in Huntsville, Alabama, traveled to the Canadian tundra to study the eclipse—specifically, a phenomenon called shadow bands. Shadow bands are thin wavy lines of alternating light and dark that can be seen moving and undulating in parallel on plain-colored surfaces immediately before and after a



A man demonstrates how to safely watch an eclipse, July 1972. (Photo credit: Smithsonian Institution Archives, Image Number SIA Acc. 11-009 [72-6685-16])



A PAIR OF SCIENTISTS FROM MARSHALL SPACE FLIGHT CENTER...TRAVELED TO THE CANADIAN TUNDRA TO STUDY THE ECLIPSE—SPECIFICALLY, A PHENOMENON CALLED SHADOW BANDS.



total solar eclipse. To this day, scientists do not fully understand how shadow bands form or how to predict their appearance during a given eclipse.

4. 26 FEBRUARY 1979

The last total solar eclipse of the 20th century in the contiguous United States was in early 1979. Totality lasted for a maximum of 2 minutes 49 seconds, and the total eclipse was visible on a narrow path stretching from the Pacific Northwest to Greenland. Agencies from Canada and the United States—including NASA—joined forces to build a sounding rocket program to study the atmosphere and ionosphere

during the eclipse by observing particles on the edge of space as the Sun's radiation was suddenly blocked.

5. 31 JULY 1981

Soviets got a great view of the Moon passing in front of the Sun in the summer of 1981, with totality lasting just over 2 minutes at maximum. NASA's scientists partnered with Hawaiian and British researchers to study the Sun's atmosphere—specifically, a relatively thin region called the chromosphere, which is sandwiched between the Sun's visible surface and the corona—using an infrared telescope aboard the Kuiper Airborne Observatory. The chromosphere appears as the red rim of the solar disk during a total solar eclipse, whereas the corona displays no discernable color to the naked eye.

For much more information about the 2017 eclipse and background information, see <https://eclipse2017.nasa.gov/>.

Answers to Voyager Crossword

1. Star Trek, 2. Carter, 3. Heliosheath, 4. September,
5. Mariner, 6. August, 7. Magnetometer, 8. Titan,
9. Fifty-five, 10. Interstellar, 11. Florida, 12. Whale,
13. Forty, 14. Plutonium, 15. Discovery, 16. Sagan

NASA HEADQUARTERS HISTORY DIVISION STAFF CONTACT INFORMATION

William Barry *bill.barry@nasa.gov*
Chief Historian 202-358-0383

Nadine Andreassen *nadine.j.andreassen@nasa.gov*
Program Support Specialist 202-358-0087

Colin Fries *colin.a.fries@nasa.gov*
Archivist 202-358-0388

Stephen Garber *stephen.j.garber@nasa.gov*
Historian 202-358-0385

Elizabeth Suckow *elizabeth.suckow-1@nasa.gov*
Archivist 202-358-0375

William Thompson *william.f.thompson@nasa.gov*
Project Coordinator 202-358-0231

Chief Archivist (Vacant)

Rebecca Charbonneau *rebecca.a.charbonneau@nasa.gov*
Intern 202-358-0680

Madison Moore *madison.l.moore@nasa.gov*
Intern 202-358-2577

IMAGE IN NASA HISTORY

As NASA's two Voyager spacecraft travel out into deep space, they carry a small American flag and a Golden Record packed with pictures and sounds—mementos of our home planet. This picture shows John Casani, Voyager project manager in 1977, holding a small Dacron flag that was folded and sewed into

the thermal blankets of the Voyager spacecraft before they launched 36 years ago. Below him lie the Golden Record (left) and its cover (right). In the background stands Voyager 2 before it headed to the launch pad. The picture was taken at Cape Canaveral, Florida, on 4 August 1977.



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