Description of document:	National Aeronautics and Space Administration (NASA) Interview Preparation Documents in the Office of Communications, 2020-2021 (sample examples only)
Requested date:	05-August-2021
Release date:	23-August-2021
Posted date:	18-July-2022
Source of document:	FOIA Request NASA Headquarters MS 5-R30, Freedom of Information Act Office 300 E Street, SW Room 5Q16 Washington, DC 20546 Fax: (202) 358-4332 Email: hq-foia@nasa.gov Online FOIA submission form (PAL)

National Aeronautics and Space Administration

Headquarters
Washington, DC 20546-0001

August 23, 2021

Reply to attn. of: Office of Communications

Re: FOIA Tracking Number 21-HQ-F-00646

This responds to your Freedom of Information Act (FOIA) request to the National Aeronautics and Space Administration (NASA), dated August 4, 2021, and received in this office on August 5, 2021. You seek:

> "A copy of each "Interview Prep Document" in the office or files of Allard Beutel (HQ-NA020) during the time period January 1, 2020 to the present. As an example, only, one such Interview prep document was distributed on June 25, 2021."

You also added the following additional comment in your request:

> "If this request would result in voluminous documents, you may limit the request to the last Interview Prep Document only in each calendar month during the time period specified (January 1, 2020 to the present)."

In an email dated August 13, 2021, you were informed that pulling records for your full request would result in a large volume of documents (approximately 850-950 total pages). You responded to narrow the scope by requesting one report every other month for 2020 and one a month for 2021 to date.

In response to your request we conducted a search of NASA's Office of Communications using the search term "interview prep document". That search identified the enclosed records that are responsive to your request. We determined that all 144 pages are appropriate for release without excision and copies are enclosed.

Appeal

If you believe this to be an adverse determination, you have the right to appeal my action on your request. Your appeal must be received within 90 days of the date of this response. Please send your appeal to:

Administrator
NASA Headquarters
Executive Secretariat
ATTN: FOIA Appeals
MS 9R17
300 E Street S.W.
Washington, DC 2054

Both the envelope and letter of appeal should be clearly marked, "Appeal under the Freedom of Information Act." You must also include a copy of your initial request, the adverse determination, and any other correspondence with the FOIA office. In order to expedite the appellate process and ensure full consideration of your appeal, your appeal should contain a brief statement of the reasons you believe this initial determination should be reversed. Additional information on submitting an appeal is set forth in the NASA FOIA regulations at 14 C.F.R. § 1206.700.

Assistance and Dispute Resolution Services

If you have any questions, please feel free to contact me at Sallie.N.Bilbo@nasa.gov or 228-688-3182. For further assistance and to discuss any aspect of your request you may contact:

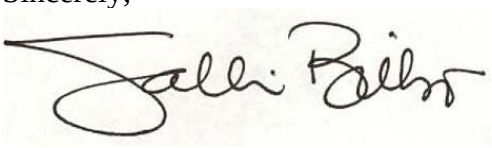
Stephanie Fox
Chief FOIA Public Liaison
Freedom of Information Act Office
NASA Headquarters
300 E Street, S.W., 5P32
Washington D.C. 20546
Phone: 202-358-1553
Email: Stephanie.K.Fox@nasa.gov

Additionally, you may contact the Office of Government Information Services (OGIS) at the National Archives and Records Administration to inquire about the FOIA mediation services it offers. The contact information for OGIS is as follows:

Office of Government Information Services
National Archives and Records Administration
8601 Adelphi Road-OGIS
College Park, MD 20740-6001
Phone: 202-741-5770
Toll Free: 1-877-684-6448
Fax: 202-741-5769
E-mail: ogis@nara.gov

Important: Please note that contacting any agency official including myself, NASA's Chief FOIA Public Liaison, and/or OGIS is not an alternative to filing an administrative appeal and does not stop the 90-day appeal clock.

Sincerely,



Sallie Bilbo
FOIA Public Liaison

Enclosure

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NASA INTERVIEW PREP DOCUMENT

RECENT HOT TOPICS

NASA Authorization Bill

The U.S. House space subcommittee approved a NASA authorization bill Jan. 29. Below is a Jan. 27 blog from NASA Administrator Jim Bridenstine:

- I would like to thank the Committee for producing a comprehensive NASA authorization bill. I am particularly encouraged that the bill is proceeding on a bipartisan basis, reflecting a consensus on a Moon to Mars approach. Maintaining a bipartisan, consensus approach is critical to constancy of purpose and supporting a long-term national commitment to the human exploration of the Moon and Mars. The bill envisions a destination of Mars while supporting missions to the Moon as the most effective strategy to achieve that critical, shared goal. NASA would appreciate the opportunity to work with the Committee in a bipartisan way, as we did with the Senate Commerce Committee, on some modifications.

  I am concerned that the bill imposes some significant constraints on our approach to lunar exploration. As you know, NASA has successfully fostered the development of a rapidly expanding commercial economy for access to space. We would like to continue building on this success as we develop the most efficient mission architectures and partnership approaches to accomplish our shared goals.

  NASA seeks to expand the sphere of economic activity deeper into space by conducting space exploration and development with commercial and international partners. Without the dynamic participation of commercial partners, our chances of creating a sustainable exploration program are significantly diminished. In particular, we are concerned that the bill's approach to developing a human lander system as fully government-owned and directed would be ineffective. The approach established by the bill would inhibit our ability to develop a flexible architecture that takes advantage of the full array of national capabilities – government and private sector – to accomplish national goals. NASA would appreciate the opportunity to work with the Committee to develop language that would support a broader national and international effort that would maximize progress toward our shared exploration goals through the efficient application of our available resources.

  NASA is fully committed to a lunar exploration program that supports and enables human missions to Mars. The Committee should be aware that the exploration of Mars is a very challenging goal both technically and from a resource perspective. If we are going to accomplish this goal, we will need the flexibility to rapidly develop technical expertise using the Moon and to fully engage commercial and international partners. We do think that the bill's concerns for limiting activities on the Moon could be counterproductive. If we are going to explore Mars in a safe and

sustainable way, we will require a strong in situ resource utilization capability and significant technology development using the surface of the Moon. NASA would appreciate more flexibility in defining lunar surface activities that may contribute directly to Mars exploration.

NASA subject matter experts are now closely reviewing the available bill text to identify issues and concerns of a more technical, detailed nature, and we would appreciate an opportunity to share the results of this review with the Committee at the appropriate time.

We would welcome an opportunity to work with the Committee on a bill that would accommodate a broader partnership approach. I appreciate the Committee's bipartisan efforts and congratulate you on producing this bipartisan consensus in favor of a Moon to Mars exploration program.

GAO Report on Webb Telescope

The Government Accountability Office (GAO) issued a report Jan. 28 called "James Webb Space Telescope: Technical Challenges Have Caused Schedule Strain and May Increase Costs." Below is our response to media who have called for comment:

- NASA's James Webb Space Telescope had many successful milestones in 2019. The spacecraft element, which comprises the spacecraft bus and sunshield, passed its environmental tests (acoustics, vibration and thermal vacuum). Following these achievements, the fully tested science payload (telescope and instruments) was integrated with the spacecraft element in August, forming the completely assembled observatory for the first time. We also successfully deployed and folded the observatory's sunshield, and we are in the process of replacing the two electronics boxes that failed during spacecraft environmental testing last year.

  2020 will be an extremely busy year for Webb as we perform full observatory-level launch environment testing (acoustics, sine vibration, deployments, system-level electrical and ground system testing), which we are preparing for now. These activities are expected to last until the end of November.

  We've reduced a lot of risk, but there are still technical challenges ahead to prepare this very complex observatory for launch. While the schedule for the March 2021 launch readiness date is tight, we are still planning toward that, without any changes to the budget. The schedule will be reviewed again in May 2020.

Spitzer Space Telescope End of Mission

The mission for NASA's Spitzer Space Telescope, one of NASA's Great Observatories, which has studied the universe in infrared light for more than 16 years, came to a close on Jan. 30.

- Spitzer Lifted the Veil on the Infrared Universe: Spitzer has been used to study and discover objects from our own solar system to the edge of the universe, including, but not limited to: Distant and nearby galaxies; star formation, evolution and death; comets, asteroids and other solar system objects; exoplanets and the formation of planetary systems; interstellar molecules and dust; black hole disks and jets.
- Spitzer is One of NASA's Great Observatories: Spitzer worked with other observatories, particularly Hubble, on major scientific studies, demonstrating the benefits of multi-wavelength astronomy.
- Spitzer Engineers Kept the Spacecraft Working Longer Than Anticipated: After the depletion of Spitzer's liquid helium supply in 2009, the operations team kept the spacecraft observing at a warmer temperature, extending its life for more than a decade. The team also overcame challenges introduced by the spacecraft's increasing distance from Earth.
- Spitzer is a Pathfinder for Future Telescopes, such as NASA's Webb Space Telescope: Webb and Spitzer observe in many of the same wavelengths, and Spitzer observations have revealed good targets for follow-up studies with Webb, as well as observatories such as Euclid. Its science legacy will continue via the Spitzer data archive.
- On Jan. 30, engineers decommissioned the Spitzer spacecraft and ceased science operations. During the 2016 NASA Senior Review process, the agency made a decision to close out the Spitzer mission. The closeout was initially planned for 2018 in anticipation of the launch of the James Webb Space Telescope, which will also conduct infrared astronomy. When Webb's launch was postponed, the Spitzer mission was granted its fifth and final extension.
    - These mission extensions have given Spitzer additional time to continue producing transformative science including pathfinding work for Webb.

SpaceX In-Flight Abort Test

NASA and SpaceX launched from NASA's Kennedy Space Center, Florida Jan. 19 the company's In-Flight Abort Test under the agency Commercial Crew Program. The test demonstrated Crew Dragon's ability to safely escape the Falcon 9 rocket in the event of a failure during launch.

- This year, NASA and its commercial providers -- Boeing and SpaceX -- are targeting the return of human spaceflight to the International Space Station from U.S. soil on American rockets and spacecraft.
- With SpaceX's in-flight abort test, NASA's Commercial Crew Program and SpaceX are demonstrating a final, critical flight test aimed at showing the new, crew capable spacecraft can protect astronauts in the event of an emergency during launch.
- NASA's commercial crew spacecraft, including the Crew Dragon, are designed to protect astronauts from a failing rocket in the event of an emergency. Although NASA and SpaceX hope to never use this system, it's a critical capability for our new, crew-designed spacecraft.

- NASA and SpaceX completed a pad abort test in 2015 when a Dragon capsule flew away from a launch pad safely simulating a pad emergency and landing in the ocean under parachutes. SpaceX also flew an end-to-end uncrewed flight test to the International Space Station in March 2019 - including launch, docking, landing and recovery operations. This in-flight abort demonstration is the final, major test before NASA astronauts fly to station on Crew Dragon.
- NASA is spurring economic growth in low-Earth orbit and working to open access to more people and more science than ever before. As we turn over low-Earth orbit to commercial companies, we are preparing to send astronauts to the Moon in 2024 and ultimately, Mars. U.S. commercial companies, such as SpaceX, are joining us.

Astronaut Class Graduation

NASA hosted its first public event to recognize its graduating class of astronauts at a pinning ceremony hosted Jan. 10 at the agency's Johnson Space Center in Houston.

- After more than two years of intensive training, NASA and the Canadian Space Agency (CSA) will officially add a total of 13 new astronauts to their ranks (11 NASA, 2 CSA), and the missions that await them will expand humanity's presence in space for decades to come.
- As graduates, these astronauts are now eligible for spaceflight assignments on commercial crew missions launching on American rockets from American soil to the International Space Station, as well as upcoming Artemis missions to the Moon, and ultimately, missions to Mars.
- These individuals also represent the first wave of NASA's Artemis Generation – first astronauts to graduate since we announced the Artemis program. The NASA astronaut candidates were selected in 2017 from more than 18,000 applicants – the most that have ever applied to our space agency. They come from all over our nation and many different walks of life as representatives as the best of America.
- For almost 20 years, humans have lived and worked continuously aboard the International Space Station, advancing scientific knowledge and demonstrating new technologies, making research breakthroughs not possible on Earth that will enable long-duration human and robotic exploration into deep space.
- The Artemis program is the next step in human exploration of our solar system. It is a part of NASA's broader Moon to Mars exploration approach, which will explore more of the Moon and prepare for our next giant leap – human exploration of Mars.
- With Artemis, NASA will send dozens of new science instruments and technology demonstrations to the lunar surface beginning in 2021 we will see the first woman and next man land on the Moon, and establish sustainable exploration with our commercial and international partners by 2028.
- NASA Administrator Jim Bridenstine also announced on Jan. 10 that this spring, the agency will begin accepting applications for the next astronaut class.

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Fiscal Year 2020 Appropriations Bill Statement

President Trump signed a Fiscal Year 2020 appropriation bill Dec. 20 that funds the federal government through Sept. 30, 2020. Below is NASA's statement about it:

- NASA is pleased with the bipartisan FY 2020 appropriations bill signed Friday by President Donald Trump, which provides record-level funding for the agency. The $22.63 billion bill provides $1.3 billion in new funding to accelerate America's return to the Moon through NASA's Artemis program, including $600 million for the development of the first human lunar lander since the Apollo era. This budget will help our country put the first woman and next man on the Moon by 2024 and cement America's leadership in space exploration

Artemis Program

During a media teleconference for the FY 2020 budget amendment on May 13, NASA Administrator Jim Bridenstine announced the name of the agency's new lunar exploration program – Artemis. Points updated Aug. 12, 2019:

- Artemis was the twin sister of Apollo and goddess of the Moon in Greek mythology. Homer called her the torch-bringer.
- NASA has led the charge in space exploration for more than six decades and through the Artemis program we will build on our work in low-Earth orbit and pave the way to the Moon and on to Mars.
- Through Artemis, we will see the first woman and next man step foot the Moon by 2024, and establish sustainable exploration with our commercial and international partners by 2028.
- The Artemis program is the next step in human exploration. It is a part of NASA's broader Moon to Mars exploration approach, in which we will quickly and sustainable explore the Moon and use what we learn there to enable humanity's next giant leap, sending astronauts to Mars.
- The early Artemis missions include:
    - Artemis I: First flight test of Space Launch System rocket and Orion spacecraft as an integrated system
    - Artemis II: First flight of Artemis crew around the Moon aboard SLS and Orion
    - Artemis III: First crew to the lunar surface (via a human landing system from the Gateway in lunar orbit)

Key Agency Points

The following points can be used to help prepare participants of upcoming conferences, events, appearances, and interviews.

<u>Moving Forward to the Moon with Artemis:</u>

- NASA is charged to get American astronauts to the Moon in the next five years with a landing on the lunar South Pole.
- We the people of NASA, are up to this challenge of once again landing humans on the Moon.

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- We will move forward to the Moon. And then we'll take what we learn on the Moon, and go to Mars.
- The technologies we develop for the Moon will make future robotic and human missions to Mars possible.
- Our backbone for deep space exploration is the most powerful rocket in the world, the Space Launch System (SLS), the Orion spacecraft and the Gateway lunar command module.
- NASA is looking at every option to keep launch of Artemis I in 2020, and we expect to have an updated launch schedule in the near future.
- The agency will continue to "use all means necessary" to ensure mission success in moving us forward to the Moon and ensure the next man and the first woman on the Moon are Americans.
- Space Policy Directive-1 provides the direction for NASA to more effectively rally commercial and international support to develop a sustainable presence on the Moon and beyond that will generates new markets and opportunities, both scientific and economic.
- Going forward to the Moon is part of a larger, sustainable exploration campaign with international and commercial partners.
    - NASA's exploration campaign cuts across three strategic areas: low-Earth orbit, the Moon, and Mars and deeper into space.
- American leadership will drive an open, sustainable and agile architecture, with international and commercial partners, to get astronauts back on the lunar surface as quickly as possible.
- This lunar effort will involve the whole of the nation, uniting the brightest minds of academia, businesses and communities of all sizes and types, and early career professionals.
- Our story is about steady progress into the unknown for the benefit of all humanity.
- Our goal has always been to get to Mars. With Congressional backing that supports a lunar landing by 2024, we will pioneer human Mars exploration in another decade.

<u>Why the Moon?:</u>

- We are going to the Moon for many reasons:
    - The Moon is a natural stepping stone to Mars. We will demonstrate technologies and expand business approaches and commercial opportunities needed for deeper space exploration.
    - On the lunar surface, we will pursue ice and other natural resources that will further enable our journey and of humanity.
    - We will secure America's preeminence in space exploration and establish a strategic presence at the Moon. A lunar investment is an investment in our future. It will create new jobs and help improve life here on Earth.
    - We will inspire a new generation and encourage careers in STEM.

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Humans in Space:

- This year we return to American soil launches of astronauts on the systems of American companies, advance commercial work toward the Moon's surface, and test new technologies for deep space exploration.
- Progress on the SLS and Orion, collaboration with commercial and international partners, and knowledge gained from our current robotic presence at the Moon and Mars drive our plan.
- Nationwide, businesses large and small are building the systems necessary for powering humankind into deep space -- creating new engineering and high-tech jobs in all 50 states and every type of community.
- The space station is the world's only crewed, multinational research laboratory and technology test bed on orbit, and is vital to our exploration future.
- We are dedicated to using the station's full potential to demonstrate technologies, learn about human health in space, and focus commercial energies on the growing low-Earth orbit economy.
- This year we have already seen one successful test of a commercial rocket capable of carrying humans. By the end of the year, NASA will once again have the capacity to fly American Astronauts to the International Space Station from American soil, with the help of NASA's Commercial Crew program.
- Our successful investment with a strong and continually growing U.S. space industry in low Earth orbit allows us to become one of many customers and focus our energies on farther horizons and also take advantage of commercial partnerships at the Moon.
- With our partners, we will use the Gateway lunar command module orbiting the Moon as a staging point for missions that allow astronauts to explore more parts of the lunar surface than ever before.

Space Technology:

- Catalyst technologies we are working on will enable critical capabilities for humans to successfully operate on the lunar surface and travel farther.

Science:

- Science is a critical part of our work to understand the universe, advance human exploration, and inspire the next generation.
- In addition to important lunar surface work, our science budget supports an ambitious program to explore our solar system and beyond. Key priorities include a Mars Sample Return mission, launch of the James Webb Space Telescope and a robust program of Earth observation.

Flight:

- Our transformative aeronautics technology research is making air travel safer and more efficient, and pioneering the next generation of aircraft.
- Our budget supports final assembly of the X-59 QueSST supersonic X-plane.
- The dynamic partnerships, infrastructure and capabilities NASA is building right now will enable future generations to continue shaping our next frontier.

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FY 2020 Budget Amendment
On May 13, the White House issued a proposed presidential budget amendment for fiscal year 2020, including additional funds to accelerate NASA's return to the Moon by 2024.

- President Donald Trump directed NASA to land American astronauts on the Moon's South Pole by 2024. We are up for the challenge.
- The fiscal year 2020 presidential budget amendment provides an increase of $1.6 billion above the original request of $21 billion. This is a good budget amendment, on top of a strong original budget request.
- This budget amendment is the down payment on humans landing at the Moon's South Pole by 2024 and is required to achieve that bold goal.
- We believe the President provided a much needed boost in this amendment that invests in America's future, creates good paying jobs across the nation, and will help us achieve our goal of landing the first woman and next man on the Moon by 2024.
- While it is not appropriate to discuss pending legislation as it goes through the deliberative process, we believe the President provided a much needed boost in his budget amendment that invests in America's future, creates good paying American jobs, and helps achieve goal of landing the first woman and the next man on the Moon by 2024.
- We appreciate the strong bipartisan support we have received from Congress.
- NASA made a specific budget request for the additional money we need in fiscal year 2020 to get us out of the gate for a landing with American astronauts on the Moon by 2024. As the Administrator has also stated, our focus is on what NASA needs, and any decisions about where the funds come from to support this request are made outside of the agency.
- Details of the President's budget request and amendment are available at: www.nasa.gov/budget

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For full key points and other products for all themes, visit: https://communications.nasa.gov.

Earth
NASA uses the vantage point of space to understand and explore our home planet, improve lives and safeguard our future.
Tagline: **Your Home. Our Mission.**

Flight
NASA explores new technologies to make aircraft quieter and faster, get you gate-to-gate safely and on time, and transform aviation into a new economic engine at all altitudes.
Tagline: **NASA is With You When You Fly.**

Humans in Space
NASA leads human space exploration in low-Earth orbit with commercial and international

partners to enable missions to the Moon and Mars. International Space Station missions are a catalyst for economic development and the advancement of scientific knowledge and new technologies that improve our lives.
Tagline: **Leading Discovery, Improving Life on Earth.**

Moon to Mars
NASA is leading a sustainable return to the Moon with commercial and international partners to expand human presence in space and bring back new knowledge and opportunities.
Tagline: Moon Lights the Way.

Solar System & Beyond
NASA is exploring our Solar System and beyond, uncovering worlds, starts, and cosmic mysteries near and far with our powerful fleet of space and ground-based missions.
Tagline: **Discovering the Secrets of the Universe.**

Space Tech
NASA technologies advance capabilities for space exploration, promote America's global leadership in innovation and transform the world around us.
Tagline: **Technology Drives Exploration.**

-end-

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NASA INTERVIEW PREP DOCUMENT

RECENT HOT TOPICS

NASA Awards Artemis Contract for Gateway Logistics Services

On March 27, NASA announced the first U.S. commercial provider under the Gateway Logistics Services contract.

- NASA has selected SpaceX as the first U.S. commercial provider under the Gateway Logistics Services contract to deliver cargo, experiments and other supplies to the agency's Gateway in lunar orbit.
- The award is a significant step forward for NASA's Artemis program that will land the first woman and next man on the Moon by 2024 and build a sustainable human lunar presence. At the Moon, NASA and its commercial and international partners will gain the experience necessary to mount a historic human mission to Mars.
- SpaceX will deliver critical pressurized and unpressurized cargo, science experiments and supplies to the Gateway, such as sample collection materials and other items the crew may need on the Gateway and during their expeditions on the lunar surface.
- NASA is planning multiple supply missions in which the cargo spacecraft will stay at the Gateway for six to 12 months at a time.
- These firm-fixed price, indefinite delivery/indefinite quantity contracts for logistics services guarantee two missions per logistics services provider with a maximum total value of $7 billion across all contracts as additional missions are needed.
- The Gateway Logistics Services contract enables NASA to order missions for as long as 12 years with a 15-year performance period and provides the ability to add new competitive providers.
- Charged with returning to the Moon in the next four years, NASA's Artemis program will reveal new knowledge about the Moon, Earth, and our origins in the solar system.
- The Gateway is a vital part of NASA's deep space exploration plans, along with the Space Launch System (SLS) rocket, Orion spacecraft, and human landing system that will send astronauts the Moon. One standard logistics service mission is anticipated for each Artemis SLS/Orion crewed mission to the Gateway.
    - Gaining new experiences on and around the Moon will prepare NASA to send the first humans to Mars in the coming years, and the Gateway will play a vital role in this process.

NASA Statement on Coronavirus Status

The following is NASA's updated statement we're providing media who inquire about the agency's latest coronavirus status, including the new CARES Act and NASA's $60 million funds for the Safety, Security and Mission Services:

- We are taking the needed steps to protect and care for the NASA team, which is critical to the success of our missions. We continue to proactively monitor the

COVID-19 situation, and NASA remains open as we adjust our operations accordingly, including the agency requiring mandatory telework for operations that don't require being physically being at a NASA facility. For on-site mission essential activities, such as preparations for the upcoming launches of the Mars Perseverance rover mission and NASA's Commercial Crew flight test (SpaceX's Demo 2) to the International Space Station, work continues. As the coronavirus situation progresses, we'll make adjustments as appropriate.

- The funds for the Safety, Security and Mission Services are to aid the agency in preventing, preparing and responding to the coronavirus. NASA is still evaluating how to apply the funds, but will look to apply some funding to IT requirements, cleaning and sanitizing facilities and other safety adjustments.

Gateway and Artemis Program Plans

Based on a NASA Advisory Council meeting discussion, media began reporting on March 13 that NASA was changing its Artemis program plans and delaying the Gateway. Below is our response for comment:

- The Gateway is a critical component of the Artemis program's sustainable lunar exploration plan. On March 13, we announced the first two science payloads that will go on Gateway, including one from our international partner, ESA (European Space Agency.)

  Additionally, on March 27, we announced we selected SpaceX to be the first U.S. commercial provider to deliver cargo, experiments and other supplies to Gateway. The contract enables NASA to order missions for up to 12 years with a 15-year performance period, and the ability to add new competitive providers.

  We are refining our plan to ensure we have the best opportunity to land the first woman and next man on the Moon in 2024 and firmly establish a sustainable presence on and around the Moon by 2028, which will lead to NASA sending astronauts to Mars as soon as the 2030s. The Gateway is essential for all that to happen.

OIG Space Launch System Costs and Contracts Report

NASA's Office of Inspector General posted a report March 10 entitled "NASA's Management of Space Launch System Program Costs and Contracts." NASA's official response is on pages 48-50. Below is what we're providing media who call for additional comment, in particular about the $50 billion number in the report.

- While NASA concurs with the findings of the Office of Inspector General (IG) report, the statement made by the Washington Post that plans to get astronauts to the Moon in 2024 could cost $50 billion, and its comparison to the Congressionally-reported number of $31 billion, represents a fundamental misunderstanding of the IG's findings. They are unrelated figures.

NASA's $31 billion estimate for the future cost of the return to the Moon with the Artemis program is based on the Fiscal Year 2021 President's Budget Request, which only includes costs in FY21-25, and only those costs expected to contribute to the first lunar landing. This includes the human landing system, Gateway, advanced cislunar and surface capabilities, Space Launch System rocket, Orion spacecraft and Exploration Ground Systems. This estimate does not include the full FY PBR total for these programs, as the budget also includes some costs for returning to the Moon in 2025 and beyond.

The $50 billion noted in the report is based upon the entirety of all the dollars spent over more than a decade past, plus the costs through 2024 for the SLS and Orion programs and supporting ground systems. In other words, the cumulative cost of historic budgets relative to exploration over an expanded period that exceeds the scope of the current program in no way reflects predicted future cost.

That said, NASA accepts that its management of SLS and Boeing's performance has been deficient, and we are moving to correct these issues. Nothing in the report was unexpected, nor it does alter our assessment of NASA's ability to achieve the goals established by the Administration to land on the Moon by 2024.

NASA Update on Orbital Flight Test Independent Review Team

NASA and Boeing held a media teleconference March 6, to discuss the outcome of the joint independent review team investigation into the primary issues detected during the company's uncrewed Orbital Flight Test in December as part of NASA's Commercial Crew Program.

- The joint NASA and Boeing Independent Review Team formed following the anomalies during the company's uncrewed Orbital Test Flight as a part of the agency's Commercial Crew Program has completed its initial investigation. The team was tasked with reviewing three primary anomalies experienced during the mission: two software coding errors and unanticipated loss of space-to-ground communication capability.
- During the investigation, the team identified several technical and organizational issues related to Boeing's work. Separate from the independent team, NASA reviewed its role in the flight test and identified several areas where the agency can improve its level of participation and involvement into company's processes.
    - The review team's analysis identified 61 corrective and preventative actions to address the two software anomalies.
    - The review team also is continuing its investigation of the intermittent space-to-ground forward link issue that impeded the flight control team's ability to command and control the spacecraft. The team has identified the technical root cause as radiofrequency interference with the communications system. While the team has recommended specific hardware improvements already

in work by the company, the full assessment and resulting recommendations will continue through March.

- Boeing already has accepted the full action list as defined by the review team and is in the process of refining its implementation schedule and incorporating this work into its plans with multiple actions already underway. As work continues, NASA and Boeing have asked the joint review team to track their progress and execution of each action.
- While the review team, NASA and Boeing have made significant progress during the last month, more work will be required to inform the agency's decision of whether Boeing will need to perform another uncrewed test flight of the Starliner system. NASA will determine whether a repeat of the flight will be needed after Boeing has presented its detailed resolution and rework plan and NASA has independently assessed the thoroughness of that plan.
- NASA also will perform an evaluation of the workplace culture of Boeing ahead of crewed test flights through an Organizational Safety Assessment (OSA).
- Further, NASA will designate the anomalies experienced during the mission as a high visibility close call. As there were no injuries during the flight, this close call designation is where the potential for a significant mishap could have occurred and should be investigated to understand the risk exposure and the root cause(s) that placed equipment or individuals at risk.
- NASA's Commercial Crew Program is working with Boeing and SpaceX to develop and operate a new generation of spacecraft and launch systems capable of carrying crews to low-Earth orbit and the International Space Station. Commercial human space transportation to and from the station will provide expanded utility, additional research time, and broader opportunities for discovery on the orbiting laboratory. The program also has the benefit of facilitating and promoting for America a vibrant economy in low-Earth orbit.

Virginia Middle School Student Earns Honor of Naming NASA's Next Mars Rover
NASA announced the name of its Mars 2020 rover mission on March 5.

- NASA's next Mars rover has a new name – Perseverance.
- The name was announced Thursday by Thomas Zurbuchen, associate administrator of the Science Mission Directorate, during a celebration at Lake Braddock Secondary School in Burke, Virginia. Zurbuchen was at the school to congratulate seventh grader Alexander Mather, who submitted the winning entry to the agency's "Name the Rover" essay contest, which received 28,000 entries from K-12 students from every U.S. state and territory.
- Perseverance is the latest in a long line of Red Planet rovers to be named by school-age children, from Sojourner in 1997 to the Spirit and Opportunity rovers, which landed on Mars in 2004, to Curiosity, which has been exploring Mars since 2012. In each case, the name was selected following a nationwide contest.
- NASA's Perseverance rover is a robotic scientist weighing just under 2,300 pounds (1,043 kilograms). Managed for the agency by NASA's Jet Propulsion Laboratory

(JPL,) the rover's astrobiology mission includes searching for signs of past microbial life. It also will characterize the planet's climate and geology, and collect samples of Martian rocks and dust for a future Mars Sample Return mission to Earth, while paving the way for human exploration of the Red Planet.

- Perseverance currently is undergoing final assembly and checkout at NASA's Kennedy Space Center in Florida. The mission is targeted to launch in July and land on Mars' Jezero Crater in February 2021.
- The Mars 2020 mission is part of a larger Moon to Mars exploration apprahc that includes missions to the Moon as a way to prepare for human exploration of the Red Planet. Charged with landing the first woman and the next man on the Moon by 2024, NASA will establish a sustained human presence on and around the Moon by 2028 through NASA's Artemis program.

Axiom, SpaceX, and Private Astronauts to the International Space Station

Axiom Space announced March 5 that has signed a contract with SpaceX for a Crew Dragon flight, which will transport a commander professionally trained by Axiom alongside three private astronauts, to and from the International Space Station. The mission is targeted for the second half of 2021. Below is our response to media who call for NASA comment:

- Axiom's partnership with SpaceX directly supports NASA's broad strategy to facilitate the commercialization of low-Earth orbit by United States entities. NASA's goal is to achieve a robust economy in low-Earth orbit from which NASA can purchase services as one of many customers. A robust commercial space economy ensures national interests for research and development in low-Earth orbit are fulfilled while allowing NASA to focus government resources on deep space exploration through the Artemis program and land the first woman and next man on the surface of the Moon in 2024.

SpaceX CRS-20 International Space Station Cargo Mission

The 20th SpaceX cargo mission to the International Space Station under NASA's Commercial Resupply Services (CRS) contract launched on a Dragon spacecraft and Falcon 9 rocket at 11:50 p.m. EST March 6 from Cape Canaveral Air Force Station, Florida. It's scheduled to arrive at the station Monday, March. 9.

- SpaceX's 20th contract resupply mission under the first Commercial Resupply Services contract (CRS-1) with NASA is scheduled to deliver more than 4,300 pounds of cargo to the International Space Station.
- The Dragon spacecraft is filled with supplies and payloads including critical materials to directly support dozens of the more than 250 science and research investigations that will occur during Expeditions 62 and 63.
- NASA is using the International Space Station to conduct cutting-edge research and technology development to help prepare our astronauts to take the next giant leap in human space exploration – to the Moon in four years and then on to Mars
- Research arriving on Dragon includes:

- The BOOST Orbital Operations on Spheroid Tesellation (Adidas BOOST) investigation looks at how multiple types of pellets behave in the molding process of performance midsoles, the layer between the sole of a shoe and the insole under your foot, by shoe company Adidas. Removing gravity from the process enables a closer look at pellet motion and location during the process.
- The Bartolomeo facility, created by ESA (European Space Agency) and Airbus, will attach to the exterior of the European Columbus Module. Designed to provide new scientific opportunities on the outside of the space station for commercial and institutional users, potential applications include Earth observation, robotics, material science and astrophysics.
- Droplet Formation Studies in Microgravity (Droplet Formation Study) evaluates water droplet formation and water flow of Delta Faucet's H2Okinetic showerhead technology. Reduced flow rates in shower devices conserve water, but also can reduce their effectiveness, and research in microgravity could help improve the technology, creating better performance and improved user experience while conserving water and energy.
- Organ-Chips as a Platform for Studying Effects of Space on Human Enteric Physiology (Gut on Chip) examines the effect of microgravity and other space-related stress factors on biotechnology company Emulate's human innervated Intestine-Chip (hiIC). A better understanding of how microgravity and other potential space travel stressors affect intestine immune cells and susceptibility to infection could help protect astronaut health on future long-term missions. It also could help identify the mechanisms that underlie development of intestinal diseases and possible targets for therapies to treat them on Earth.
- The Nonequilibrium Processing of Particle Suspensions with Thermal and Electrical Field Gradients (ACE-T-Ellipsoids) experiment designs and assembles complex three-dimensional colloids – small particles suspended within a fluid – and controls density and behavior of the particles with temperature. Called self-assembled colloidal structures, these are vital to the design of advanced optical materials, but control of particle density and behavior is especially important for their use in 3D printing. Microgravity provides insight into the relationships among particle shape, crystal symmetry, density and other characteristics.
- Generation of Cardiomyocytes From Human Induced Pluripotent Stem Cell-derived Cardiac Progenitors Expanded in Microgravity (MVP Cell-03) examines whether microgravity increases the production of heart cells from human-induced pluripotent stem cells (hiPSCs). HiPSCs are adult cells genetically reprogrammed back into an embryonic-like pluripotent state, which means they can give rise to several different types of cells, which makes them capable of providing an unlimited source of human cells for research or therapeutic purposes. These heart cells or cardiomyocytes (CMs) could help treat cardiac abnormalities caused by spaceflight. In

addition, scientists could use them to replenish cells damaged or lost due to cardiac disease on Earth and for cell therapy, disease modeling and drug development. Human cardiac tissues damaged by disease cannot repair themselves, and loss of CMs contributes to eventual heart failure and death.

Astronaut Recruitment

NASA announced on Feb. 11 that it will open up recruitment for a new class of Artemis Generation astronauts from March 2 to 31, 2020.

- As NASA prepares to launch American astronauts this year on American rockets from American soil to the International Space Station – with an eye toward the Moon and Mars – the agency is announcing it will accept applications March 2 to 31 for the next class of Artemis Generation astronauts.
- The basic requirements to apply include United States citizenship and a master's degree in a STEM field, including engineering, biological science, physical science, computer science, or mathematics, from an accredited institution.
    - Candidates also must have at least two years of related, progressively responsible professional experience, or at least 1,000 hours of pilot-in-command time in jet aircraft. Astronaut candidates must pass the NASA long-duration spaceflight physical.
- NASA expects to select the new class of astronaut candidates in mid-2021 to begin training as the next class of Artemis Generation astronauts.
- As part of the application process, applicants will, for the first time, be required to take an online assessment that will require up to two hours to complete.
- After completing training, the new astronauts could launch on American rockets and spacecraft developed for NASA's Commercial Crew Program to live and work aboard the International Space Station, 250 miles above Earth, where they will take part in experiments that benefit life at home and prepare us for more distant exploration.
- They may also launch on NASA's powerful new Space Launch System rocket and Orion spacecraft, docking the spacecraft at the Gateway in lunar orbit before taking a new human landing system to the Moon's surface. After returning humans to the Moon in 2024, NASA plans to establish sustainable lunar exploration by 2028. Gaining new experiences on and around the Moon will prepare NASA to send the first humans to Mars in the mid-2030s.
- Starting March 2, Americans may apply to #BeAnAstronaut at: **www.usajobs.gov**

Fiscal Year 2021 NASA Budget

President Trump released NASA's Fiscal Year 2021 budget proposal.

- This is a 21st Century budget worthy of 21st Century space exploration – one of the strongest budgets in NASA's history.
- The President's budget this year invests more than $25 billion dollars for America's future in space – one that will see the return of **human spaceflight to American**

soil for the first time in almost a decade and advances ***Artemis***, while still supporting NASA's full suite of science, aeronautics, and technology work.

- This budget keeps us on the road to land the first woman and the next man on the **Moon by 2024** and, with support of the **Gateway**, helps prepare us for exploration of **Mars** and beyond.
- The President has directed over $3 billion dollars toward development of a **human lunar landing** system. The first time we have had direct funding for a human lander since Apollo.
- The budget fully supports our **Space Launch System** rocket, **Orion** spacecraft, and the systems needed for the first flights of Artemis to quickly, and safely get to the Moon, and test the systems needed to push forward to America's next giant leap – sending astronauts to explore Mars.
- The funding proposed represents an increase of about **12% over last year's request**, and we know it comes at a time of constrained resources for the federal government.
- In Science, the budget **supports the decadal priorities** such a Mars sample return mission, Europa Clipper, and development of new Earth observation missions.
- This budget positions NASA to continue leading the expansion of a vital **low-Earth orbit economy** for the United States through **commercial and international partnerships**, while also setting us on course to lead the way toward a sustainable presence on the Moon and eventual human exploration of Mars.
- Additional Points
    - This budget fully supports the next steps needed to push us to the Moon and beyond, but it doesn't do it at the expense of NASA's other priorities.
    - The President fully supports the International Space Station, as well as returning the launch of American astronauts on American rockets from American soil. This is the year we put America back in the human spaceflight business to stay.
    - As we know, technology powers exploration, and this budget invests in critical, reusable systems needed to get us to the Moon, Mars, and beyond, including next-generation robotics and crew habitats.
    - In Aeronautics, the budget supports our goal of commercial supersonic aircraft research and our critical investments in Unmanned Aerial System Technologies to make flying with commercial and private aircraft safer and more efficient in the 21st Century.
    - This budget secures American leadership in space and focuses on the agency's core missions of exploration, scientific discovery, cutting-edge technology, and aerospace investments with strong bipartisan support in Congress.
    - NASA's vital work takes place at every field center and in every state, stimulating economies, creating good paying jobs, and improving life every day here on Earth.

- We will transfer and grow this successful commercial economy NASA created for low-Earth orbit to the Moon and beyond.
- With this budget, NASA harnesses America's commercial innovation to do things never before done. NASA plans to partner with private industry to accelerate our human lunar landing plan and develop the Gateway, and send science and technology missions to the lunar surface.
- And we will continue to inspire new generations of explorers and use every opportunity to engage educators, students, and the public to explore new frontiers and launch new dreams as part of a new "Artemis Generation." Join us.

Fiscal Year 2020 Appropriations Bill Statement

President Trump signed a Fiscal Year 2020 appropriation bill Dec. 20, 2019 that funds the federal government through Sept. 30, 2020. Below is NASA's statement about it:

- NASA is pleased with the bipartisan FY 2020 appropriations bill signed Dec. 20 by President Donald Trump, which provides record-level funding for the agency. The $22.63 billion bill provides $1.3 billion in new funding to accelerate America's return to the Moon through NASA's Artemis program, including $600 million for the development of the first human lunar lander since the Apollo era. This budget will help our country put the first woman and next man on the Moon by 2024 and cement America's leadership in space exploration.

Artemis Program

During a media teleconference for the FY 2020 budget amendment on May 13, NASA Administrator Jim Bridenstine announced the name of the agency's new lunar exploration program – Artemis. Points updated Aug. 12, 2019:

- Artemis was the twin sister of Apollo and goddess of the Moon in Greek mythology. Homer called her the torch-bringer.
- NASA has led the charge in space exploration for more than six decades and through the Artemis program we will build on our work in low-Earth orbit and pave the way to the Moon and on to Mars.
- Through Artemis, we will see the first woman and next man step foot the Moon by 2024, and establish sustainable exploration with our commercial and international partners by 2028.
- The Artemis program is the next step in human exploration. It is a part of NASA's broader Moon to Mars exploration approach, in which we will quickly and sustainable explore the Moon and use what we learn there to enable humanity's next giant leap, sending astronauts to Mars.
- The early Artemis missions include:
  - Artemis I: First flight test of Space Launch System rocket and Orion spacecraft as an integrated system
  - Artemis II: First flight of Artemis crew around the Moon aboard SLS and Orion

- Artemis III: First crew to the lunar surface (via a human landing system from the Gateway in lunar orbit)

AGENCY COMMUNICATION THEME PRIORITIES

For full key points and other products for all themes, visit: https://communications.nasa.gov.

Earth

NASA uses the vantage point of space to understand and explore our home planet, improve lives and safeguard our future.
Tagline: **Your Home. Our Mission.**

Flight

NASA explores new technologies to make aircraft quieter and faster, get you gate-to-gate safely and on time, and transform aviation into a new economic engine at all altitudes.
Tagline: **NASA is With You When You Fly.**

Humans in Space

NASA leads human space exploration in low-Earth orbit with commercial and international partners to enable missions to the Moon and Mars. International Space Station missions are a catalyst for economic development and the advancement of scientific knowledge and new technologies that improve our lives.
Tagline: **Leading Discovery, Improving Life on Earth.**

Moon to Mars

NASA is leading a sustainable return to the Moon with commercial and international partners to expand human presence in space and bring back new knowledge and opportunities.
Tagline: Moon Lights the Way.

Solar System & Beyond

NASA is exploring our Solar System and beyond, uncovering worlds, stars, and cosmic mysteries near and far with our powerful fleet of space and ground-based missions.
Tagline: **Discovering the Secrets of the Universe.**

Space Tech

NASA technologies advance capabilities for space exploration, promote America's global leadership in innovation and transform the world around us.
Tagline: **Technology Drives Exploration.**

-end-

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NASA INTERVIEW PREP DOCUMENT

RECENT HOT TOPICS

NASA's SpaceX Demo-2 Test Flight

On May 29, SpaceX and NASA launch managers approved moving forward with NASA's SpaceX Demo-2 crewed test flight to the International Space Station for NASA's Commercial Crew Program. Launch from the agency's Kennedy Space Center in Florida is targeted for 3:22 p.m. EDT Saturday, May 30, weather permitting, after the first launch attempt was scrubbed because of weather on May 27.

- A new era of human spaceflight is set to begin as American astronauts Robert Behnken and Douglas Hurley once again launch on an American rocket from American soil to the International Space Station as part of NASA's Commercial Crew Program – the first time since the end of the Space Shuttle Program in 2011.
- NASA astronauts Robert Behnken and Douglas Hurley will fly on SpaceX's Crew Dragon spacecraft, lifting off on a Falcon 9 rocket at 3:22 p.m. EDT Saturday, May 30 from NASA Kennedy Space Center's Launch Complex 39A in Florida, for an extended stay at the space station for NASA's SpaceX Demo-2 mission.
- Demo-2 is an end-to-end test flight from launch to docking to splashdown to recovery operations, and it's the final test for the system to be certified for regular, crew flights to the space station.
- For almost 20 years, humans have continuously lived and worked aboard the International Space Station, advancing scientific knowledge and demonstrating new technologies that enable us to prepare for human exploration to the Moon and Mars. The station's design requires humans living aboard to maintain it, operate it, and upgrade it; thus, International Space Station operations, including commercial resupply and commercial crew, are essential to the mission.
- NASA is enabling economic growth in low-Earth orbit and working to open access to more people and more science than ever before. As we turn over low-Earth orbit to commercial companies, we are preparing to explore the Moon and Mars – and commercial companies, like SpaceX, will join us on that journey.

Message Regarding the Lead of Human Spaceflight

The following message was sent to NASA employees and provided to media on May 19:

- Associate Administrator for Human Exploration and Operations Doug Loverro has resigned from his position effective Monday, May 18.

  Loverro hit the ground running this year and has made significant progress in his time at NASA. His leadership of HEO has moved us closer to accomplishing our goal of landing the first woman and the next man on the Moon in 2024. Loverro has dedicated more than four decades of his life in service to our country, and we thank him for his service and contributions to the agency.

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Effective immediately, Ken Bowersox will serve as Acting Associate Administrator for HEO. Bowersox, currently the Deputy Associate Administrator for HEO, is a retired U.S. Naval Aviator with more than two decades of experience at NASA. He is an accomplished astronaut and a veteran of five space shuttle missions and commander on the International Space Station. Bowersox has previously led HEO in a time of transition, and NASA has the right leadership in place to continue making progress on the Artemis and Commercial Crew programs.

Next week will mark the beginning of a new era in human spaceflight with the launch of NASA astronauts Bob Behnken and Doug Hurley to the International Space Station. We have full confidence in the work Kathy Lueders and her entire Commercial Crew team have done to bring us here. This test flight will be a historic and momentous occasion that will see the return of human spaceflight to our country, and the incredible dedication by the men and women of NASA is what has made this mission possible.

- Related to NASA's SpaceX Demo2 test flight, NASA Administrator Jim Bridenstine provided media the following statement:
    - "I have full confidence in the work Kathy Lueders and her entire Commercial Crew team have done over the past six years to get us to where we are today - on the cusp of safely launching American astronauts from American soil on American rockets. Agency leadership, SpaceX, and NASA's team of engineers and experienced human spaceflight professionals, have reviewed the Commercial Crew Program regularly for years. I'm looking forward to participating in a very important Flight Readiness Review on Thursday as we take the next step toward a successful launch of the Demo-2 test flight on the 27th."

The NASA "Worm" Logo is Back

NASA announced April 2 the "worm" NASA logo is being brought out of retirement and will be used for some official agency activities. However, the "meatball" will remain NASA's primary insignia.

- The primary insignia for NASA is, and remains, what is known as the "meatball." But, on April 2, the agency announced that the "worm" logo is back. And just in time to mark the return of human spaceflight on American rockets from American soil.
- The retro, 1970's modern design of the agency's logo will help capture the excitement of a new, modern era of human spaceflight on the side of the Falcon 9 rocket that will ferry astronauts to the International Space Station as part of NASA's Commercial Crew Program Demo-2 flight test, now scheduled for mid- to late May.
- The agency still is assessing how and where the NASA "worm" will be used beyond the Demo-2 test. And the "meatball" remain NASA's main logo.

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- For background: The original NASA insignia – “the meatball” -- is one of the most powerful symbols in the world. However, with 1970’s technology, it was a difficult icon to reproduce, print, and many people considered it a complicated metaphor in what was considered, then, a modern aerospace era. A cleaner, sleeker design born of the Federal Design Improvement Program officially was introduced in 1975. It featured a simple, red unique type style of the word NASA. It became known as “the worm.”
    - Created by the firm of Danne & Blackburn, the logo was honored in 1984 by President Reagan for its simplistic, yet innovative design.
    - NASA was able to thrive with multiple graphic designs. There was a place for both the meatball and the worm. However, in 1992, the 1970s brand was retired - except on clothing and other souvenir items - in favor of the original late 1950s graphic. Until now, when both are back in use.
- NASA’s Commercial Crew Program is working with Boeing and SpaceX to develop and operate a new generation of spacecraft and launch systems capable of carrying crews to low-Earth orbit and the International Space Station. Commercial human space transportation to and from the station will provide expanded utility, additional research time, and broader opportunities for discovery on the orbiting laboratory. The program also has the benefit of facilitating and promoting for America a vibrant economy in low-Earth orbit.

Artemis Accords Agreements
On May 15, NASA announced the Artemis Accords agreements.

- Statement:
    - International space agencies that join NASA in the Artemis program will do so by executing bilateral Artemis Accords agreements, which will describe a shared vision for principles, grounded in the Outer Space Treaty of 1967, to create a safe and transparent environment which facilitates exploration and science.
- Background:
    - Via the Artemis program, NASA will land the first woman and the next man on the Moon by 2024, heralding in a new era for space exploration and utilization.
    - While NASA is leading the Artemis program, international partnerships will play a key role in achieving a sustainable and robust presence on the Moon while preparing to conduct a historic human mission to Mars.
    - With numerous countries and private sector players conducting missions and operations in cislunar space, it’s critical to establish a common set of principles to govern the civil exploration and use of outer space.
    - International space agencies that join NASA in the Artemis program will do so by executing bilateral Artemis Accords agreements, which will describe a shared vision for principles, grounded in the Outer Space Treaty of 1967, to

create a safe and transparent environment which facilitates exploration, science, and commercial activities for all of humanity to enjoy.

- Related to China's Long March-5B rocket part that re-entered the atmosphere May 11, below is a statement NASA Administrator Jim Bridenstine provided media:
  - "The empty core stage of the Long March-5B, weighing nearly 20 tons, was in an uncontrolled freefall along a path that carried it over Los Angeles and other densely populated areas. As a matter of fact, had this spent rocket stage, which is the largest uncontrolled object to fall from low-Earth orbit in almost 30 years, reentered earlier, it could have hit New York. Two villages in Cote d'Ivoire have reported finding what they believe to be debris from the fallen rocket stage. I can think of no better example of why we need the Artemis Accords. It's vital for the U.S. to lead and establish norms of behavior against such irresponsible activities. Space exploration should inspire hope and wonder, not fear and danger."

Human Landing Systems for Artemis Missions to the Lunar Surface
On April 30, NASA announced the selection of three companies to design and develop human landing systems for the Artemis program.

- NASA has selected three U.S. companies to design and develop human landing systems (HLS) for the agency's Artemis program, one of which will land the first woman and next man on the surface of the Moon by 2024. NASA is on track for sustainable human exploration of the Moon for the first time in history.
- The following companies were selected:
  - Blue Origin of Kent, Washington, is developing the Integrated Lander Vehicle (ILV) – a three-stage lander to be launched on its own New Glenn Rocket System and ULA Vulcan launch system.
  - Dynetics (a Leidos company) of Huntsville, Alabama, is developing the Dynetics Human Landing System (DHLS) – a single structure providing the ascent and descent capabilities that will launch on the ULA Vulcan launch system.
  - SpaceX of Hawthorne, California, is developing the Starship – a fully integrated lander that will use the SpaceX Super Heavy rocket.
- The human landing system awards under the Next Space Technologies for Exploration Partnerships (NextSTEP-2) Appendix H Broad Agency Announcement (BAA) are firm-fixed price, milestone-based contracts. The total combined value for all awarded contracts is $967 million for the 10-month base period.
- With these contract awards, America is moving forward with the final step needed to land astronauts on the Moon by 2024. This is the first time since the Apollo era that NASA has direct funding for a human landing system, and now we have companies on contract to do the work for the Artemis program.
- NASA will continue to evaluate these companies' lunar lander designs and approaches as they are refined during the base period, culminating in a down-selection at the end of the base period to identify the contractor(s) that will go on to perform initial crewed demonstration missions on the lunar surface. A follow-on

procurement effort will focus on sustainable lander systems with the intent to provide the lowest long-term cost to access the lunar surface.
- When NASA returns to the Moon in four years with the Artemis program, it will go in a way that reflects the world today – with government, industry, and international partners in a global effort to build and test the systems needed for challenging missions to Mars and beyond.

NASA and Actor Tom Cruise Movie
On May 4, media began reporting that NASA, SpaceX, and actor Tom Cruise are planning to film a movie aboard the International Space Station. The following statement was sent from NASA Administrator Jim Bridenstine's Twitter account on May 5:
- "NASA is excited to work with @TomCruise on a film aboard the @Space_Station! We need popular media to inspire a new generation of engineers and scientists to make @NASA's ambitious plans a reality."
- When media asked for additional details, we've been saying:
  - "We will say more about the project at the appropriate time. Anything else now would be premature."

NASA Contributes Expertise and Ingenuity to COVID-19 Fight
On April 23, NASA Administrator Jim Bridenstine led a media videoconference highlighting some of the contributions the agency has made to fight COVID-19.
- NASA has joined the fight against coronavirus (COVID-19) with efforts underway across the country to augment the national response.
- As Administrator Bridenstine said:
  - "NASA's strength has always been our ability and passion – collective and individual – for solving problems. All the work being done shows how NASA is uniquely equipped to aid in the federal response to coronavirus by leveraging the ingenuity of our workforce, mobilizing investments made in the U.S. space agency to combat this disease, and working with public and private partnerships to maximize results."
- The R&D spotlighted April 23 included:
  - VITAL Ventilator – Engineers at NASA's Jet Propulsion Laboratory in California designed a new high-pressure ventilator. The device, called VITAL, is designed to treat patients with milder symptoms, thereby keeping the nation's limited supply of traditional ventilators available for patients with more severe COVID-19 symptoms.
  - Positive Pressure Helmet – NASA's Armstrong Flight Research Center teamed up with a task force in Antelope Valley, California to solve possible shortages of medical equipment in the local community. The first of these efforts, a positive pressure oxygen helmet, has been successfully tested.
  - Surface Decontamination System – NASA's Glenn Research Center in Ohio guided the development and production of a small, portable and economical

device called AMBUStat that decontaminates spaces, such as ambulances, at a fraction of the cost of systems currently in use.

- In addition to these agency workforce developed ideas and worked with partners to quickly respond to the health crisis within the last month, on April 1, NASA launched an agencywide call for ideas on its internal crowdsourcing platform NASA@WORK for how the agency can leverage its expertise and capabilities to help the nation with this unprecedented crisis. In just two weeks, 250 ideas were submitted, more than 500 comments were submitted, and more than 4,500 votes were cast.
- NASA's legacy of human space exploration, research and technology development has yielded countless innovations that prove the direct and profound impact of taxpayer investment in America's space program on our quality of life on Earth, including improved technologies for water purification, air filtration, kidney dialysis and tele-medicine. We can only speculate as to the breadth of transformative benefits that will come from America's return to the Moon through NASA's Artemis program and our efforts to put the first humans on Mars.

Fiscal Year 2021 NASA Budget

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- This is a 21st Century budget worthy of 21st Century space exploration – one of the strongest budgets in NASA's history.
- The President's budget this year invests more than $25 billion dollars for America's future in space – one that will see the return of **human spaceflight to American soil** for the first time in almost a decade and advances ***Artemis***, while still supporting NASA's full suite of science, aeronautics, and technology work.
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partnerships, while also setting us on course to lead the way toward a sustainable presence on the Moon and eventual human exploration of Mars.

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AGENCY COMMUNICATION THEME PRIORITIES

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NASA uses the vantage point of space to understand and explore our home planet, improve lives and safeguard our future.
Tagline: **Your Home. Our Mission.**

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Humans in Space

NASA leads human space exploration in low-Earth orbit with commercial and international partners to enable missions to the Moon and Mars. International Space Station missions

are a catalyst for economic development and the advancement of scientific knowledge and new technologies that improve our lives.
Tagline: **Leading Discovery, Improving Life on Earth.**

Moon to Mars
NASA is leading a sustainable return to the Moon with commercial and international partners to expand human presence in space and bring back new knowledge and opportunities.
Tagline: Moon Lights the Way.

Solar System & Beyond
NASA is exploring our Solar System and beyond, uncovering worlds, stars, and cosmic mysteries near and far with our powerful fleet of space and ground-based missions.
Tagline: **Discovering the Secrets of the Universe.**

Space Tech
NASA technologies advance capabilities for space exploration, promote America's global leadership in innovation and transform the world around us.
Tagline: **Technology Drives Exploration.**

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NASA INTERVIEW PREP DOCUMENT

RECENT HOT TOPICS

Greg Autry CFO Nomination

On July 22, President Trump announced his intent to nominate Greg Autry to be NASA's Chief Financial Officer. NASA Administrator Jim Bridenstine provided the following public comment on his Twitter account:

- Congratulations to Dr. Greg Autry on being nominated to be @NASA CFO. I urge the Senate to confirm him swiftly.

Overall Statement about COVID-19 Impacts to NASA

- As the agency navigates its response to COVID-19, NASA leadership continues to prioritize employee health and safety. A majority of the agency's workforce continues to telework, however, agency leadership has developed guidance to assist center leaders in making decisions on how to safely bring back employees to perform mission-critical work on-site to minimize impacts. This guidance takes into account guidelines provided by the White House and the Offices of Personnel Management and Management and Budget, and calls for a controlled, methodical and flexible return to on-site work.

Mars 2020 Mission and Human Exploration of Mars

On July 20 at a Space Foundation meeting, NASA Administrator Jim Bridenstine and other NASA leadership discussed the agency's Mars 2020 mission with its Perseverance rover and future astronaut missions to Mars.

- Statement:
    - Between the upcoming Mars 2020 Perseverance rover mission and dozens of planned robotic and human missions to the Moon as part of the Artemis program, NASA and our partners are opening the door to smarter, safer human missions to Mars.

      Space is a harsh environment and robotic science missions are critical to paving the way for human exploration farther into the solar system. Robots and humans will explore more of the Moon than ever before throughout this decade. We will in turn replicate a lot of what we do at the Moon to send the first humans to Mars as early as the 2030s.
- Moon to Mars Key Points:
    - NASA's long-term goal has always been to send humans to Mars – and we need the Moon to help us get there. This is America's Moon to Mars exploration approach.
    - As global interest and capabilities in space exploration continue to expand at a rapid rate, America must lead the return to the Moon and the first human mission to Mars to search for life farther in the solar system.

- NASA anticipates sending the first humans to Mars on a two-year journey, which increases propulsion requirements while limiting radiation requirements and other mission risks. This approach allows 30 days on the Martian surface and is ample time to search for life. It would also exceed the total time of Apollo missions on the Moon.
- Just as we're doing at the Moon, we will build up our capabilities at Mars over time.
- We already know more about Mars today than we did when we sent the first humans to the Moon with the Apollo program. The Perseverance rover, Mars Sample Return and Mars Ice Mapper missions will teach us even more about the Martian environment and water resources before we send astronauts on the most challenging human exploration mission in our history.
- Among the investigations onboard, the Perseverance rover will carry two that will support future crewed missions to the fourth planet - one to produce oxygen from the Martian atmosphere and another to aid in development of weather forecasting. The mission will also use new terrain navigation and landing technologies as well as study how a potential spacesuit material is affected by the Martian environment.
- Artemis missions will serve as a unique opportunity for the agency and its partners to test, refine, and perfect many of the technologies and complex operations needed for human exploration of Mars as early as the 2030s.
- After establishing an Artemis Base Camp on the lunar South Pole and subsequently expanding the Gateway's capabilities in orbit around the Moon, NASA will conduct a dress rehearsal for sending the first human to Mars.

Mars 2020 Perseverance Rover Mission

NASA's Mars 2020 mission and its Perseverance rover are targeted to lift off from Cape Canaveral Air Force Station in Florida during a launch window that opens at 7:50 a.m. EDT Thursday, July 30. Landing on Mars is scheduled for Feb. 18, 2021.

- Mission objectives are:
  - Search for signs of ancient microbial life in a crater that billions of years ago might have been a body of water the size of Lake Tahoe.
  - Characterize the geology and climate of Mars
  - Help pave the way for human exploration beyond the Moon
  - Take samples to leave on the surface for return to Earth in a few years. First leg of a round trip to Mars.
- Key points:
  - The Perseverance rover is the next mission in NASA's storied Mars Exploration Program Perseverance joins a fleet that right now includes a rover, a lander and multiple spacecraft in orbit of the Red Planet.
  - This mission carries the most sophisticated instruments ever sent to Mars.

- Perseverance addresses high-priority science goals for Mars exploration -- including key astrobiology questions about the potential for past life on Mars, what the environment was like billions of years ago, what might be preserved in the unique rocks of Jezero Crater, and what the environment is like today.
- Mars 2020 is part of America's larger Moon to Mars exploration approach, which includes astronaut missions to the Moon beginning in 2024 that prepare for human exploration of the Red Planet in the 2030s.
- Perseverance will gather knowledge and demonstrate technologies that address the challenges of future human expeditions to Mars, including an oxygen-generating experiment and the first helicopter on another planet.
- Perseverance is the beginning of the first round-trip to another planet. The rover will collect rock and soil samples for return to Earth by future missions.
- The public will get to ride along. The mission has more cameras than any previous interplanetary mission, and two microphones for us to hear Mars for the first time.
- The Perseverance name embodies the agency's spirit in finding solutions to challenges, and the mission itself personifies the human ideal of persevering toward the future.

NASA's SpaceX Demo-2 Test Flight

NASA's SpaceX Demo-2 crewed test flight to the International Space Station launched May 30 from the agency's Kennedy Space Center in Florida and docked to the space station May 31. The Demo-2 crew's return to Earth is targeted for Aug. 2.

- A new era of human spaceflight has begun as American astronauts Robert Behnken and Douglas Hurley launched on an American rocket from American soil to the International Space Station as part of NASA's Commercial Crew Program – the first time since the end of the Space Shuttle Program in 2011.
- NASA astronauts Robert Behnken and Douglas Hurley flew on SpaceX's Crew Dragon spacecraft, lifting off on a Falcon 9 rocket at 3:22 p.m. EDT Saturday, May 30 from NASA Kennedy Space Center's Launch Complex 39A in Florida, for an extended stay at the space station for NASA's SpaceX Demo-2 mission.
- Demo-2 is an end-to-end test flight from launch to docking to splashdown to recovery operations, and it's the final test for the system to be certified for regular, crew flights to the space station.
- For almost 20 years, humans have continuously lived and worked aboard the International Space Station, advancing scientific knowledge and demonstrating new technologies that enable us to prepare for human exploration to the Moon and Mars. The station's design requires humans living aboard to maintain it, operate it, and upgrade it; thus, International Space Station operations, including commercial resupply and commercial crew, are essential to the mission.
- NASA is enabling economic growth in low-Earth orbit and working to open access to more people and more science than ever before. As we turn over low-Earth orbit

to commercial companies, we are preparing to explore the Moon and Mars – and commercial companies, like SpaceX, will join us on that journey.

OIG Report on Orion

The NASA Office of the Inspector General (OIG) issue a report July 16 entitled "NASA's Management of the Orion Multi-Purpose Crew Vehicle," which reviewed the agency's management of the Orion Program. The report makes three recommendations to increase the sustainability, accountability, and transparency of the Orion Program and improve NASA's management of award fees. The agency concurred with the recommendations. NASA's official response is on pages 50-52 of the report.

- NASA is constructing some of the most sophisticated software and hardware ever built to carry astronauts to the Moon for decades to come as part of the Artemis program and in preparation for human exploration to Mars.
- Orion is designed to carry humans far beyond low-Earth orbit, sustain crew for weeks at a time outside the protection of Earth's magnetosphere, and protect them during return to Earth from deep space velocities.
- NASA's effort to build a sustainable infrastructure to, from, and on the Moon is an extremely challenging engineering endeavor that has never been done before.
- The Orion Program has consistently reported all costs through the annual budget process and is committed to transparency.
- NASA and Lockheed Martin have implemented a wide array of measures to control cost growth, such as organization consolidation as the program completes design work, manufacturing improvements from lessons learned in EFT-1, AA-2, and testing, along with contracting improvements.
- NASA has also reviewed management processes and implemented measures to streamline the review, decision and approval processes during design and manufacturing.
- NASA has incorporated lessons learned both from the contracting process and from technical design and development into its recent contract for production of future Orion vehicles with Lockheed Martin and continues to look for areas to improve efficiencies and reduce costs.

NASA and Zodiac Signs

The week of July 12, media began reporting on an erroneous story from 2016 that said NASA has changed the Zodiac signs. Social media also has included this topic. Below is our response, which we also used in 2016, for media calling for comment:

- "NASA studies astronomy not astrology. We didn't change any Zodiac signs, we just did the math. The Space Place article, which has been quoted as the source of this story, was about how astrology is not astronomy, how it was a relic of ancient history, and pointed out the science and math that did come from observations of the night sky."

"Smell of Space" Fragrance

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Media recently have been reporting that a Kickstarter funding campaign has launched a new fragrance called Eau de Space, which the fragrance creator says came from his work with NASA in 2008 as part of the agency's training to prepare astronauts for the smells of space. Most media have not contacted NASA to check on this story, but this week we responded to some who did call for comment:

- "NASA is working to build a strong economy in low-Earth orbit and welcomes scientific research and space entrepreneurism, however, we have no record of working with any entity to develop or identify the 'smell of space' for use in astronaut training. NASA has not used any simulated 'smell of space' for training purposes, and does not plan to do so in the future."

House NASA Appropriations Bill

On July 7, the U.S. House of Representatives Commerce-Justice-Science subcommittee released a NASA appropriations bill. Below is the statement from NASA Administrator Jim Bridenstine provided to media who called for comment:

- "I want to thank the House Commerce-Justice-Science subcommittee for the bipartisan support they have shown for NASA's Artemis program. The $628.2 million in funding for the human landing system (HLS) is an important first step in this year's appropriations process. We still have more to do, and I look forward to working with the Senate to ensure America has the resources to land the first woman and next man on the Moon in 2024."

Naming of NASA Facilities

During the week of July 5, a number of media outlets called asking for comment about the naming or renaming of NASA facilities. Below is our response:

- NASA Headquarters remained the only primary facility not named in honor of a major contributor to aerospace. Mary W. Jackson was the first female African-American engineer at NASA and was part of the historic West Area Computing Unit at Langley, Virginia. She also spent her career advancing opportunities for women and minorities in engineering.

  Plans are being made to officially dedicate the Mary W. Jackson Headquarters Building, which sits on Hidden Figures Way, a section of E Street SW named in honor of the African American women who made up the segregated mathematicians of the West Area Computing Unit.

  Agency leader leadership is sensitive to the discussions of racism, discrimination, and inequalities going on around the world, including conversations about the renaming of other NASA facilities. We are having ongoing discussions with the NASA workforce on these vital issues.

  NASA is dedicated to advancing diversity, and we will continue to take steps to do so.

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Naming of NASA Headquarters

On June 24, NASA announced it was naming the NASA Headquarters building in Washington, D.C., after Mary W. Jackson, the first African American female engineer at the agency. The following are quotes from NASA Administrator Jim Bridenstine in the announcement news release:

- "Mary W. Jackson was part of a group of very important women who helped NASA succeed in getting American astronauts into space. Mary never accepted the status quo, she helped break barriers and open opportunities for African Americans and women in the field of engineering and technology," said Bridenstine. "Today, we proudly announce the Mary W. Jackson NASA Headquarters building. It appropriately sits on 'Hidden Figures Way,' a reminder that Mary is one of many incredible and talented professionals in NASA's history who contributed to this agency's success. Hidden no more, we will continue to recognize the contributions of women, African Americans, and people of all backgrounds who have made NASA's successful history of exploration possible.

  "NASA facilities across the country are named after people who dedicated their lives to push the frontiers of the aerospace industry. The nation is beginning to awaken to the greater need to honor the full diversity of people who helped pioneer our great nation. Over the years NASA has worked to honor the work of these Hidden Figures in various ways, including naming facilities, renaming streets and celebrating their legacy," added Bridenstine. "We know there are many other people of color and diverse backgrounds who have contributed to our success, which is why we're continuing the conversations started about a year ago with the agency's Unity Campaign. NASA is dedicated to advancing diversity, and we will continue to take steps to do so."

Fiscal Year 2021 NASA Budget

President Trump released NASA's Fiscal Year 2021 budget proposal.

- This is a 21st Century budget worthy of 21st Century space exploration – one of the strongest budgets in NASA's history.
- The President's budget this year invests more than $25 billion dollars for America's future in space – one that will see the return of **human spaceflight to American soil** for the first time in almost a decade and advances **Artemis**, while still supporting NASA's full suite of science, aeronautics, and technology work.
- This budget keeps us on the road to land the first woman and the next man on the **Moon by 2024** and, with support of the **Gateway**, helps prepare us for exploration of **Mars** and beyond.
- The President has directed over $3 billion dollars toward development of a **human lunar landing** system. The first time we have had direct funding for a human lander since Apollo.

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- The budget fully supports our **Space Launch System** rocket, **Orion** spacecraft, and the systems needed for the first flights of Artemis to quickly, and safely get to the Moon, and test the systems needed to push forward to America's next giant leap – sending astronauts to explore Mars.
- The funding proposed represents an increase of about **12% over last year's request**, and we know it comes at a time of constrained resources for the federal government.
- In Science, the budget **supports the decadal priorities** such a Mars sample return mission, Europa Clipper, and development of new Earth observation missions.
- This budget positions NASA to continue leading the expansion of a vital **low-Earth orbit economy** for the United States through **commercial and international partnerships**, while also setting us on course to lead the way toward a sustainable presence on the Moon and eventual human exploration of Mars.
- Additional Points
    - This budget fully supports the next steps needed to push us to the Moon and beyond, but it doesn't do it at the expense of NASA's other priorities.
    - The President fully supports the International Space Station, as well as returning the launch of American astronauts on American rockets from American soil. This is the year we put America back in the human spaceflight business to stay.
    - As we know, technology powers exploration, and this budget invests in critical, reusable systems needed to get us to the Moon, Mars, and beyond, including next-generation robotics and crew habitats.
    - In Aeronautics, the budget supports our goal of commercial supersonic aircraft research and our critical investments in Unmanned Aerial System Technologies to make flying with commercial and private aircraft safer and more efficient in the 21st Century.
    - This budget secures American leadership in space and focuses on the agency's core missions of exploration, scientific discovery, cutting-edge technology, and aerospace investments with strong bipartisan support in Congress.
    - NASA's vital work takes place at every field center and in every state, stimulating economies, creating good paying jobs, and improving life every day here on Earth.
    - We will transfer and grow this successful commercial economy NASA created for low-Earth orbit to the Moon and beyond.
    - With this budget, NASA harnesses America's commercial innovation to do things never before done. NASA plans to partner with private industry to accelerate our human lunar landing plan and develop the Gateway, and send science and technology missions to the lunar surface.
    - And we will continue to inspire new generations of explorers and use every opportunity to engage educators, students, and the public to explore new

frontiers and launch new dreams as part of a new "Artemis Generation." Join us.

Fiscal Year 2020 Appropriations Bill Statement
President Trump signed a Fiscal Year 2020 appropriation bill Dec. 20, 2019 that funds the federal government through Sept. 30, 2020. Below is NASA's statement about it:

- NASA is pleased with the bipartisan FY 2020 appropriations bill signed Dec. 20 by President Donald Trump, which provides record-level funding for the agency. The $22.63 billion bill provides $1.3 billion in new funding to accelerate America's return to the Moon through NASA's Artemis program, including $600 million for the development of the first human lunar lander since the Apollo era. This budget will help our country put the first woman and next man on the Moon by 2024 and cement America's leadership in space exploration.

Artemis Program
During a media teleconference for the FY 2020 budget amendment on May 13, NASA Administrator Jim Bridenstine announced the name of the agency's new lunar exploration program – Artemis. Points updated Aug. 12, 2019:

- Artemis was the twin sister of Apollo and goddess of the Moon in Greek mythology. Homer called her the torch-bringer.
- NASA has led the charge in space exploration for more than six decades and through the Artemis program we will build on our work in low-Earth orbit and pave the way to the Moon and on to Mars.
- Through Artemis, we will see the first woman and next man step foot the Moon by 2024, and establish sustainable exploration with our commercial and international partners by 2028.
- The Artemis program is the next step in human exploration. It is a part of NASA's broader Moon to Mars exploration approach, in which we will quickly and sustainable explore the Moon and use what we learn there to enable humanity's next giant leap, sending astronauts to Mars.
- The early Artemis missions include:
    - Artemis I: First flight test of Space Launch System rocket and Orion spacecraft as an integrated system
    - Artemis II: First flight of Artemis crew around the Moon aboard SLS and Orion
    - Artemis III: First crew to the lunar surface (via a human landing system from the Gateway in lunar orbit)

AGENCY COMMUNICATION THEME PRIORITIES

For full key points and other products for all themes, visit: https://communications.nasa.gov.

Earth

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NASA uses the vantage point of space to understand and explore our home planet, improve lives and safeguard our future.
Tagline: **Your Home. Our Mission.**

Flight
NASA explores new technologies to make aircraft quieter and faster, get you gate-to-gate safely and on time, and transform aviation into a new economic engine at all altitudes.
Tagline: **NASA is With You When You Fly.**

Humans in Space
NASA leads human space exploration in low-Earth orbit with commercial and international partners to enable missions to the Moon and Mars. International Space Station missions are a catalyst for economic development and the advancement of scientific knowledge and new technologies that improve our lives.
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NASA technologies advance capabilities for space exploration, promote America's global leadership in innovation and transform the world around us.
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NASA Agency Economic Impact Report

NASA commissioned a study of the economic impact of its Moon to Mars program for fiscal year 2019 to better understand how its activities impacted the American economy. The FY 2019 study was completed by the Nathalie P. Voorhees Center for Neighborhood and Community Improvement at the University of Illinois at Chicago, and NASA made the study public Sept. 25.The agency will perform an economic impact study every two years.

- With an investment of just one-half of 1% of the federal budget, NASA generates more than $64.3 billion in total economic output annually.
- In pursuit of its mission to discover and expand knowledge for the benefit of humanity, the agency produced an economic benefit equal to three times its $21.5 billion budget in FY2019.
- NASA employment and spending supports more than 312,000 jobs nationwide.
- NASA generates an estimated $7 billion in federal, state, and local taxes throughout the United States.
- Every state in the country benefits economically through NASA. Forty-three states have an economic impact of more than $10 million. Of those 43 states, eight have an economic impact of $1 billion or more.
- The agency's Moon to Mars program, funded at $4.9 billion for FY2019, supports more than 69,000 jobs and provides $14 billion in economic output and $1.5 billion in tax revenue. We anticipate these figures to double by 2021. There is $4.9 billion in cost in FY2019 as compared to a budget projection of $10.8 billion in FY2021.
- The average annual wage supported by NASA is $75,657, whereas the national average is $62,977 in comparable sectors.
- The wage data is a direct reflection of the highly skilled labor needed to fulfill the nation's space exploration goals. In addition to engineers and scientists so often associated with the space agency's work force, the data references specialized skills including IT operations, electronic equipment, software operations, research and development, manufacturing, education, administration and management.
- Approximately 22% of NASA's economic impacts are attributable to its Moon to Mars program, which includes NASA's Artemis program.
- According to a 2019 report by the Space Foundation, 81 nations are active in space, employing more than one million people, and accounting for more than $85 billion in annual spending. The global space economy has grown to more than $400 billion.
- NASA had more than 700 active international agreements for various scientific research and technology development activities in FY2019. The International Space Station, representing 15 nations and five space agencies, has a predominant role in the agency's international partnerships.
- NASA spinoff technologies provide an impact on American lives beyond dollars and jobs. For example, engineers at JPL developed, in just 37 days, a ventilator specifically for COVID-19 patients and, after securing an emergency use authorization from the Food and Drug Administration, made the design available to select manufacturers at no cost.

- Alabama, Colorado, Florida, Texas, California, Utah, Ohio, Virginia, Louisiana, and Mississippi account for 96% of all Moon to Mars economic impacts, with Alabama, Colorado and Utah enjoying the largest concentration of those economic benefits.
- NASA initiatives and programs, along with the many other technologies required to make it all possible, represent a significant investment in our nation's industrial base and manufacturing capabilities, research and education endeavors, and national technology development. As of result of NASA missions, our 2019 tech transfer activities produced more than 1,800 new technology reports, filed 85 new patent applications, had 122 patents issued, and establish more than 2,600 software usage agreements.

Artemis Phase I Plan

On Sept. 21, NASA publicly shared an update on its Artemis program, including the latest Phase 1 plans to land the first woman and the next man on the surface of the Moon in 2024.

- Since accepting the challenge to accelerate our return to the Moon, NASA's Artemis program is well underway. We have all the key hardware and contracts in plan to ensure we return to the Moon within four years and establish sustainable exploration by the end of the decade.
- Phase 1 of our Artemis exploration plans includes all robotic and human activities on and around the Moon. NASA will launch two flights tests of the Space Launch System rocket and Orion spacecraft before the Artemis III mission, which will include using a commercial human landing system to send astronauts to the surface of the Moon.
- Artemis is a 21st century lunar exploration program that includes all of NASA's science, technology and human spaceflight plans on and around the Moon throughout this decade.
- With contributions from each of our NASA centers across the nation, American industry and a growing number of international partners, Artemis is humanity's return to the Moon.
- Built with commercial and international partners, the Gateway is part of the backbone of our long-term exploration plans on and around the Moon. NASA is on track to launch the integrated power and propulsion element and habitation and logistics outpost in 2023.
- Our Artemis Phase 1 Plan complements our Lunar Sustainability Concept report issued earlier this year and together these products best outline our plan to date on how we will use the Moon to prepare for our next giant leap – human exploration of Mars as early as the 2030s.
- A crewed lunar landing by 2024 is key to a successful Moon to Mars exploration approach. The United States leads in space exploration now, and as more and more countries and companies take aim at the Moon, America needs the soonest possible landing date to maintain and build on that leadership.
- Each human landing system partner is making incredible progress during this initial base period toward developing their systems for exploration. NASA will decide in February 2021 on which design(s) we'll move forward with for the 2024 lunar landing.
- Landing on the Moon within four years will better focus everyone on the engineering, technology development, and process establishment necessary to safely and successfully carry out sustained human exploration of the Moon.
- Ahead of a human return to the Moon, NASA will deliver dozens of science instruments and technology demonstrations to the lunar surface through its Commercial Lunar Payload Services initiative beginning with two flights in 2021.

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Northrop Grumman (NG-14) Resupply Mission to the International Space Station
Northrop Grumman's 14th contract resupply mission under the second Commercial Resupply Services contract with NASA is targeted for launch on Tuesday, Sept. 29 from the Mid-Atlantic Regional Spaceport's Pad-0A at NASA's Wallops Flight Facility on Wallops Island. A five-minute launch window will open at approximately 10:27 p.m. EDT.

- Northrop Grumman's 14th NASA-contracted resupply mission will use its Cygnus spacecraft launched on the company's Antares rocket to carry almost 8,000 pounds of crew supplies, scientific research, and hardware to the International Space Station to support the Expedition 64 crew.
- Experiments Cygnus will take to the space station, which will directly support dozens of the more than 250 science and research investigations during Expeditions 64 and 65, include:
    - The Plant Habitat-02 investigation, which will study how radishes grow in space to prepare for feeding future crews on deep space missions.
    - The Onco Selectors investigation, which leverages microgravity to identify targeted cancer therapies.
    - The Universal Waste Management System, a more compact and reliable space toilet that will be used on the space station and on the Artemis II crewed mission to the Moon.
        - Using lessons learned over 60 years of space exploration and new technology, the Universal Waste Management System (UWMS) is smaller, more effective, and easier to use to aid crew members. The cost to design, develop, and build the two UWMS units is approximately $23 million. What we learn from use of the toilet on the space station will inform the build of the UWMS for missions to the Moon.
    - The Ammonia Electro-Oxidation investigation, which studies a potential innovative water recovery system.
    - The ISS Experience EVA Camera, which will be used to film a spacewalk and Earth views in cinematic 360-degree virtual reality.
    - And plans with Estée Lauder to photograph the company's New Advanced Night Repair serum in the space station's iconic cupola window as part of NASA's efforts to enable business activities at the space station and develop a robust low-Earth orbit economy.
- The Cygnus spacecraft will arrive at the space station Saturday, Oct. 3 at about 5:15 a.m. Northrop Grumman named the NG CRS-14 Cygnus spacecraft after Kalpana Chawla, who made history as the first female astronaut of Indian descent. It is the company's tradition to name each Cygnus after an individual who has played a pivotal part in the legacy of human spaceflight.
- The Cygnus spacecraft is scheduled to remain at the space station until mid-December, when it will depart the orbiting laboratory. Cygnus will remain in orbit for about two weeks to complete its secondary mission of hosting both the Northrop Grumman built SharkSat payload and the Saffire-V experiment.
    - The SharkSat prototype payload is mounted to Cygnus and will collect data about the performance of new technologies in low-Earth orbit. Once these experiments are complete, Cygnus will deorbit and dispose of several tons of trash during a fiery reentry into Earth's atmosphere.

- Cargo resupply from U.S. companies ensures a national capability to deliver critical science research to the space station, significantly increasing NASA's ability to conduct new investigations at the only laboratory in space.
- NASA is using the International Space Station to conduct cutting-edge research and technology development to help prepare to send the first woman and the next man to the Moon in four years and use what we learn there to take the next giant leap – sending astronauts to Mars.

Tom Cruise Flight to the International Space Station Reports
Media have been reporting actor Tom Cruise is "scheduled" to launch aboard a SpaceX Crew Dragon to the International Space Station in October 2021. Below is our response for media calling for confirmation:

- NASA has not yet scheduled any private astronaut missions to the International Space Station.

Venus Possible Signs of Life Study
On Sept. 14, a study published in Nature Astronomy announced the discovery of phosphine gas in Venus' atmosphere, which media reported could be a sign of life there. Below is our response for media calling for NASA comment:

- "Over the past two decades, we've made new discoveries that collectively imply a significant increase of the likelihood to find life elsewhere. As with an increasing number of planetary bodies, Venus is proving to be an exciting place of discovery, though it had not been a significant part of the search for life because of its extreme temperatures, atmospheric composition and other factors. Two of the next four candidate missions for NASA's Discovery Program missions are focused on Venus, as is Europe's EnVision mission, in which NASA is a partner. Venus also is a planetary destination we can reach with smaller missions.

  "NASA was not involved in the referenced study and cannot comment directly on the findings; however, we trust in the scientific peer review process and look forward to the robust discussion that will follow its publication."

Netflix Challenger Documentary
On Sept. 15, a four-part documentary on the space shuttle Challenger accident debuted on Netflix. Below is our response to media calling for NASA comment:

- Although we were not actively involved in the production, we did provide publicly available footage, as we routinely do with all documentaries. Spaceflight always will have an inherently high risk. But to this day, the lessons learned from the Challenger, Apollo 1, and Columbia accidents help drive us to ensure our astronauts can safely carry out their missions and make the benefits we all receive from space exploration worth the risk.

NASA and Estée Lauder
On Sept. 16, media began reporting that a new skin serum by Estée Lauder will be flying to the International Space Station this month aboard Northrop Grumman's next cargo mission, and once aboard the space station, NASA astronauts will be tasked with capturing imagery and video of the product. Below is our response to media calls for comment:

- "For nearly 20 years humans have lived and worked continuously aboard the International Space Station, advancing scientific knowledge and demonstrating new technologies, making research breakthroughs not possible on Earth. That work continues and is set to expand," said Phil McAlister, director of commercial spaceflight development at NASA Headquarters. "Soon we'll be able to expand the size of the crew because of our work with SpaceX and Boeing to fly four people to space at a time, and that also means we can do more science. We're dedicating a modest amount of crew time – just 5% -- to commercial and marketing activities because a robust space economy will support national interests and our Congressional direction to transition 'to a regime where NASA is one of many customers of a low-Earth orbit commercial human space flight enterprise.'"
- Additional Data Points:
    - In order to stimulate demand, the agency developed the pricing policy made public and announced on June 7, 2019, and will periodically reassess it with the goal to eventually move to full cost. The pricing policy costs were the basis for the Space Act Agreement. Future companies will be also be assessed against the current pricing policy unless unplanned unique services not included in the pricing policy are requested and approved.
    - NASA set aside 5% of its crew resources allocation to enable the development of a low-Earth orbit economy to stimulate demand. This 5% can be used in areas outside of typical space station research activities. Any interested U.S. entity can submit a proposal under Focus Area 3 of the NASA Research Announcement.
    - NASA's requirement for the use of this 5% was the proposed activity must meet one of three criteria: require the unique microgravity environment; have a nexus to the NASA mission; or support the development of a sustainable low-Earth orbit economy
    - NASA is making available every year 90 hours of crew time and 385 pounds (175 kilograms) of cargo launch capability, but will limit the amount provided to any one company to ensure competition in the market.

Lunar Resources Solicitation

On Sept. 10, NASA announced a Request for Quotation to purchase lunar regolith and/or rocks from commercial companies.

- NASA is working aggressively to meet our near-term goal of landing the first woman and next man on the Moon by 2024, and our Artemis program also is focused on taking steps that will establish a safe and sustainable lunar exploration architecture.
- To that end, NASA has released a solicitation for commercial companies to provide proposals for the purchase of extracted lunar resources to support safe and sustainable exploration.
- On April 6, the president signed Executive Order 13914 on "Encouraging International Support for the Recovery and Use of Space Resources," which establishes U.S. policy toward the recovery and use of resources in outer space, such as water and certain minerals on the Moon and other celestial bodies, to encourage the commercial development of space.
    - The authority of this policy is codified in the U.S. Space Resource Exploration and Utilization Act of 2015 and the Executive Order further clarifies that it is the policy of

the United States to encourage international support for the public and private recovery and use of resources in outer space, consistent with applicable law.

- NASA's solicitation will put that policy into practice.
- To meet NASA's requirements, a company would need to:
    - Collect a small amount of Moon "dirt" or rocks from any location on the lunar surface;
    - Provide imagery to NASA of the collection and the collected material, along with data that identifies the collection location; and
    - Conduct an "in-place" transfer of ownership of the lunar regolith or rocks to NASA.
- After ownership transfer, NASA will determine retrieval methods for the lunar regolith at a later date. NASA payment is exclusively for the resource material.
- We anticipate multiple awards for the purchase of lunar regolith and/or rock material. It is a full and open competition, not limited to U.S. companies, making this a global exercise.
- Next-generation lunar science and technology is a main objective for returning astronauts to the Moon and preparing for Mars. During the next decade, the Artemis program will lay the foundation for a sustained long-term human presence on the lunar surface and use the Moon to validate deep space systems and operations before embarking on the much farther voyage to Mars.

Mars 2020 Mission and Human Exploration of Mars
On July 20 at a Space Foundation meeting, NASA Administrator Jim Bridenstine and other NASA leadership discussed the agency's Mars 2020 mission with its Perseverance rover and future astronaut missions to Mars.

- Statement:
    - Between the upcoming Mars 2020 Perseverance rover mission and dozens of planned robotic and human missions to the Moon as part of the Artemis program, NASA and our partners are opening the door to smarter, safer human missions to Mars.

      Space is a harsh environment and robotic science missions are critical to paving the way for human exploration farther into the solar system. Robots and humans will explore more of the Moon than ever before throughout this decade. We will in turn replicate a lot of what we do at the Moon to send the first humans to Mars as early as the 2030s.
- Moon to Mars Key Points:
    - NASA's long-term goal has always been to send humans to Mars – and we need the Moon to help us get there. This is America's Moon to Mars exploration approach.
    - As global interest and capabilities in space exploration continue to expand at a rapid rate, America must lead the return to the Moon and the first human mission to Mars to search for life farther in the solar system.
    - NASA anticipates sending the first humans to Mars on a two-year journey, which increases propulsion requirements while limiting radiation requirements and other mission risks. This approach allows 30 days on the Martian surface and is ample time to search for life. It would also exceed the total time of Apollo missions on the Moon.

- Just as we're doing at the Moon, we will build up our capabilities at Mars over time.
- We already know more about Mars today than we did when we sent the first humans to the Moon with the Apollo program. The Perseverance rover, Mars Sample Return and Mars Ice Mapper missions will teach us even more about the Martian environment and water resources before we send astronauts on the most challenging human exploration mission in our history.
- Among the investigations onboard, the Perseverance rover will carry two that will support future crewed missions to the fourth planet - one to produce oxygen from the Martian atmosphere and another to aid in development of weather forecasting. The mission will also use new terrain navigation and landing technologies as well as study how a potential spacesuit material is affected by the Martian environment.
- Artemis missions will serve as a unique opportunity for the agency and its partners to test, refine, and perfect many of the technologies and complex operations needed for human exploration of Mars as early as the 2030s.
- After establishing an Artemis Base Camp on the lunar South Pole and subsequently expanding the Gateway's capabilities in orbit around the Moon, NASA will conduct a dress rehearsal for sending the first human to Mars.

Reported Federal Investigation of Doug Loverro
On Aug. 14, the Wall Street Journal published an article entitled "U.S. Probes Former NASA Official's Contacts With Boeing Executive on Lunar Contracts" related to former Human Exploration and Operations Associate Administrator Doug Loverro, Boeing, and the Artemis human landing systems contract awards announced in April. Below is our response to media calling for comment:

- "Doug Loverro offered his resignation to the Administrator on May 18 of this year. It would be inappropriate to discuss personnel actions and the reasons behind those decisions. However, we are confident in our procurement processes. We are unaware of the status of any investigation and therefore cannot provide you any update."

Greg Autry CFO Nomination
On July 22, President Trump announced his intent to nominate Greg Autry to be NASA's Chief Financial Officer. NASA Administrator Jim Bridenstine provided the following public comment on his Twitter account:

- Congratulations to Dr. Greg Autry on being nominated to be @NASA CFO. I urge the Senate to confirm him swiftly.

Overall Statement about COVID-19 Impacts to NASA

- As the agency navigates its response to COVID-19, NASA leadership continues to prioritize employee health and safety. A majority of the agency's workforce continues to telework, however, agency leadership has developed guidance to assist center leaders in making decisions on how to safely bring back employees to perform mission-critical work on-site to minimize impacts. This guidance takes into account guidelines provided by the White House and the Offices of Personnel Management and Management and Budget, and calls for a controlled, methodical and flexible return to on-site work.

Fiscal Year 2021 NASA Budget
President Trump released NASA's Fiscal Year 2021 budget proposal.

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- This is a 21st Century budget worthy of 21st Century space exploration – one of the strongest budgets in NASA's history.
- The President's budget this year invests more than $25 billion dollars for America's future in space – one that will see the return of **human spaceflight to American soil** for the first time in almost a decade and advances ***Artemis***, while still supporting NASA's full suite of science, aeronautics, and technology work.
- This budget keeps us on the road to land the first woman and the next man on the **Moon by 2024** and, with support of the **Gateway**, helps prepare us for exploration of **Mars** and beyond.
- The President has directed over $3 billion dollars toward development of a **human lunar landing** system. The first time we have had direct funding for a human lander since Apollo.
- The budget fully supports our **Space Launch System** rocket, **Orion** spacecraft, and the systems needed for the first flights of Artemis to quickly, and safely get to the Moon, and test the systems needed to push forward to America's next giant leap – sending astronauts to explore Mars.
- The funding proposed represents an increase of about **12% over last year's request**, and we know it comes at a time of constrained resources for the federal government.
- In Science, the budget **supports the decadal priorities** such a Mars sample return mission, Europa Clipper, and development of new Earth observation missions.
- This budget positions NASA to continue leading the expansion of a vital **low-Earth orbit economy** for the United States through **commercial and international partnerships**, while also setting us on course to lead the way toward a sustainable presence on the Moon and eventual human exploration of Mars.
- Additional Points
    - This budget fully supports the next steps needed to push us to the Moon and beyond, but it doesn't do it at the expense of NASA's other priorities.
    - The President fully supports the International Space Station, as well as returning the launch of American astronauts on American rockets from American soil. This is the year we put America back in the human spaceflight business to stay.
    - As we know, technology powers exploration, and this budget invests in critical, reusable systems needed to get us to the Moon, Mars, and beyond, including next-generation robotics and crew habitats.
    - In Aeronautics, the budget supports our goal of commercial supersonic aircraft research and our critical investments in Unmanned Aerial System Technologies to make flying with commercial and private aircraft safer and more efficient in the 21st Century.
    - This budget secures American leadership in space and focuses on the agency's core missions of exploration, scientific discovery, cutting-edge technology, and aerospace investments with strong bipartisan support in Congress.
    - NASA's vital work takes place at every field center and in every state, stimulating economies, creating good paying jobs, and improving life every day here on Earth.
    - We will transfer and grow this successful commercial economy NASA created for low-Earth orbit to the Moon and beyond.
    - With this budget, NASA harnesses America's commercial innovation to do things never before done. NASA plans to partner with private industry to accelerate our human lunar landing plan and develop the Gateway, and send science and technology missions to the lunar surface.

- And we will continue to inspire new generations of explorers and use every opportunity to engage educators, students, and the public to explore new frontiers and launch new dreams as part of a new "Artemis Generation." Join us.

Fiscal Year 2020 Appropriations Bill Statement
President Trump signed a Fiscal Year 2020 appropriation bill Dec. 20, 2019 that funds the federal government through Sept. 30, 2020. Below is NASA's statement about it:

- NASA is pleased with the bipartisan FY 2020 appropriations bill signed Dec. 20 by President Donald Trump, which provides record-level funding for the agency. The $22.63 billion bill provides $1.3 billion in new funding to accelerate America's return to the Moon through NASA's Artemis program, including $600 million for the development of the first human lunar lander since the Apollo era. This budget will help our country put the first woman and next man on the Moon by 2024 and cement America's leadership in space exploration.

AGENCY COMMUNICATION THEME PRIORITIES

For full key points and other products for all themes, visit: https://communications.nasa.gov.

Earth

NASA uses the vantage point of space to understand and explore our home planet, improve lives and safeguard our future.
Tagline: **Your Home. Our Mission.**

Flight

NASA explores new technologies to make aircraft quieter and faster, get you gate-to-gate safely and on time, and transform aviation into a new economic engine at all altitudes.
Tagline: **NASA is With You When You Fly.**

Humans in Space

NASA leads human space exploration in low-Earth orbit with commercial and international partners to enable missions to the Moon and Mars. International Space Station missions are a catalyst for economic development and the advancement of scientific knowledge and new technologies that improve our lives.
Tagline: **Leading Discovery, Improving Life on Earth.**

Moon to Mars

NASA is leading a sustainable return to the Moon with commercial and international partners to expand human presence in space and bring back new knowledge and opportunities.
Tagline: Moon Lights the Way.

Solar System & Beyond

NASA is exploring our Solar System and beyond, uncovering worlds, stars, and cosmic mysteries near and far with our powerful fleet of space and ground-based missions.
Tagline: **Discovering the Secrets of the Universe.**

Space Tech

NASA technologies advance capabilities for space exploration, promote America's global leadership in innovation and transform the world around us.

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Tagline: **Technology Drives Exploration.**

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NASA INTERVIEW PREP DOCUMENT

RECENT HOT TOPICS

Presidential Transition NASA Statement

The following is a statement for media asking for NASA comment about the presidential transition.

- NASA enjoys bipartisan support of our science mission, aeronautics research, technology development, and human exploration goals, and we look forward to continuing America's exploration plans on behalf of the next administration.

SpaceX's CRS-21 Cargo Mission to the International Space Station

SpaceX's 21st (CRS-21) contract resupply mission and its first under the second Commercial Resupply Services contract (CRS-2) is targeted to launch on the company's Dragon spacecraft on a Falcon 9 rocket at 11:39 a.m. EST Saturday, Dec. 5 from Launch Complex 39A at NASA's Kennedy Space Center in Florida.

- SpaceX's 21st contract resupply mission under the second Commercial Resupply Services contract (CRS-2) with NASA is scheduled to deliver more than 6,400 pounds of cargo to the International Space Station.
- The SpaceX Dragon spacecraft will be filled with supplies and payloads including critical materials to directly support dozens of the more than 250 science and research investigations that will occur during Expeditions 64 and 65.
- Some of the science being delivered on this mission includes:
    - A study aimed at better understanding heart disease to support development of treatments for patients on Earth and countermeasures for future space exploration
    - Research into how microbes can be used for biomining on asteroids
    - A tool being tested for quick and accurate blood analysis in microgravity
    - An experiment that will look at how liquid metals behave in microgravity as a first step toward developing techniques that could be used for construction of human space habitats, as well as to repair damage from micrometeoroids or space debris
    - An experiment that studies how microgravity affects small, living masses of cells as a way to understand the effects of spaceflight on the brain. This investigation could pave the way for additional exploration of changes to neurons during spaceflight, including studies of pharmacology, disease, aging, and more
    - Delivery of the first commercially owned and operated airlock on the space station, the Nanoracks Bishop Airlock, will arrive in the unpressurized trunk of the Dragon cargo spacecraft. Bishop will provide a variety of capabilities to the orbiting laboratory, including cubesat deployment, and support of external payloads.
- Cargo resupply from U.S. companies ensures a national capability to deliver critical science research to the space station, significantly increasing NASA's ability to conduct new investigations at the only laboratory in space.
- NASA is using the International Space Station to conduct cutting-edge research and technology development to help prepare to send the first woman and the next man to the Moon in 2024 and use what we learn there to take the next giant leap – sending astronauts to Mars.

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China Lunar Sample Return Mission
On Nov. 24 (Nov. 23 EST time), China launched Chang'e-5, a robotic mission designed to land on the Moon, collect lunar samples, and return them to Earth. The following is a NASA statement posted on the agency's Twitter account:

- With Chang'e 5, China has launched an effort to join the U.S. & the former Soviet Union in obtaining lunar samples. We hope China shares its data with the global scientific community to enhance our understanding of the Moon like our Apollo missions did & the Artemis program will.

Sentinel-6 Freilich Mission Launch
The Sentinel-6 Michael Freilich mission satellite launched Nov. 21 from Vandenberg Air Force Base in California.

- Sentinel-6/Michael Freilich is the first of two identical satellites that will be launched five years apart designed to:
  - measure the height of the ocean
  - help to ensure the continuation of a decades-long record of sea level observations out to 2030
  - measure temperature and humidity in the troposphere, the atmospheric layer in which we live, and the stratosphere directly above it.
- NASA developed the mission with the European Space Agency, the European Organisation for the Exploitation of Meteorological Satellites, and the National Oceanic and Atmospheric Administration. The European Commission is providing funding support. France's space agency, the Centre National d'Etudes Spatiales, also is supporting the mission.
- Sentinel-6 Michael Freilich will extend our data record of global and regional sea level to nearly 40 years, long enough to observe a wide variety of natural cycles as well as long-term changes to sea level and climate.
- The satellite's data will provide us with the clearest, most sensitive measure of sea level rise from space to date. Both Sentinel-6 Michael Freilich and its twin launching five years from now will measure sea level down to the centimeter for more than 90% of the world's oceans.
- The mission will provide key insight into the emerging acceleration of sea level rise both globally and locally and, in turn, how quickly we will need to adapt to it.
- The satellite is named in honor of the former director of NASA's Earth Science Division, Michael Freilich. He was a pioneer in oceanography from space and dedicated his life to better understanding Earth, with the goal of improving the lives of those who call it home.
- This is the first NASA-ESA space mission cooperation in Earth science, but it builds on a highly successful NASA-European partnership that has provided 28-plus years of sea level measurement from space. Sentinel-6 also marks the first international involvement in the European Copernicus Programme.
- Ten years of measurements from Sentinel-6 will contribute important data to our climate record by measuring very accurately the global temperature of the atmosphere from the troposphere to the stratosphere.
- The Sentinel missions will help improve our weather forecasts by providing global observations of atmosphere temperature and humidity in all weather conditions, while sea surface height measurements provide a measure of ocean heat content that fuels hurricanes and extreme weather events

- The mission will provide improved resolution and new data on smaller ocean features, including those near coastlines, not detectable by previous missions.
- NASA uses the vantage point of space to increase our understanding of our home planet, improve lives, and safeguard our future.

Senate Appropriations NASA Bill

The Senate Appropriations Committee on Nov. 10 released a $23.5 billion funding bill for NASA's Fiscal Year 2021. Below is our response to media calling for comment:

- NASA is exceptionally grateful for the strong bipartisan support for the Artemis program, and for NASA's science, aeronautics, space technology, and human exploration programs. Congress has continued to recognize the value in our Moon to Mars plans with both the House and Senate providing funding toward human landing system (HLS) development. Although not everything NASA has requested for HLS has passed at this time, we're still advocating to see the program fully funded. We're continuing our work toward a sustainable exploration program that lasts a generation. With bipartisan support, our children may know people living on the Moon.

NASA's SpaceX Crew 1 Mission to the International Space Station

NASA's SpaceX Crew-1 mission to the International Space Station is the first crew rotation flight of the SpaceX Crew Dragon spacecraft on a Falcon 9 rocket following certification by NASA for regular flights to the space station as part of the agency's Commercial Crew Program. Crew-1 launched Nov. 15 and arrived at the space station Nov. 16.

- NASA and SpaceX have begun a regular cadence of missions with astronauts launching on an American rocket from American soil to the International Space Station as part of NASA's Commercial Crew Program.
    - NASA's partnership with American private industry is changing the arc of human spaceflight history by opening access to low-Earth orbit and the International Space Station to more people, more science and more commercial opportunities.
    - This mission also enables expanded International Space Station use, additional research time and broader opportunities of discovery aboard the orbiting laboratory.
- The first crew rotation mission, called NASA's SpaceX Crew-1, opens the door for a full crew of four astronauts to fly on a next generation of spacecraft, including the first mission with an international partner.
- NASA astronauts Michael Hopkins, Victor Glover, Shannon Walker, and Soichi Noguchi of the Japan Aerospace Exploration Agency (JAXA) will carrying out a long-duration stay aboard the orbiting laboratory conducting science and maintenance. The four astronauts are set to return in spring 2021.
- After successfully docking, the astronauts of Crew-1 were welcomed aboard station by NASA astronaut Kate Rubins and Sergey Ryzhikov and Sergey Kud-Sverchkov of the Russian space agency Roscosmos. The seven will be the station's Expedition 64 crew.
- The Crew Dragon being used for this flight will remain docked to the station for the full length of a long-duration space station expedition, lasting approximately six months. The Crew-1 astronauts will spend their time aboard the International Space Station conducting new and exciting scientific research in areas such as botany, cancer, and technology.
    - Radishes will be grown in space. This model plant is nutritious, grows quickly, and is genetically similar to Arabidopsis, a plant frequently studied in microgravity. Findings could help optimize growth of the plants in space as well as provide an

assessment of their nutrition and taste. Scientists are leveraging microgravity to tests drugs based on messenger ribonucleic acids (mRNA) for treating leukemia. A new toilet headed to the space station has a number of features that improve on current space toilet operations and help us prepare for future missions, including those to the Moon and Mars.

- During their stay on the orbiting laboratory, astronauts of Crew-1 will see a range of unpiloted spacecraft including the Northrop Grumman Cygnus, the next generation of SpaceX cargo Dragon spacecraft, and the Boeing CST-100 Starliner on its uncrewed flight test to the station. They will also conduct a variety of spacewalks and welcome crews of the Russian Soyuz vehicle and the next SpaceX Crew Dragon in 2021.

Presidential Election

Below is our response to media asking for NASA comment on the Nov. 3 presidential election.

- NASA enjoys strong bipartisan support for the agency's science, aeronautics, space technology and human exploration programs. It is not our place to comment on the election. We continue to do our work as usual, supporting the agency's Moon to Mars exploration plans, technology projects, and space and Earth science priorities.

Showtime's Moonbase 8

A new Showtime production, Moonbase 8, is a limited series comedy portraying three NASA astronauts at a Moon base simulator in Arizona. NASA did not participate in the production, nor have we had an opportunity to screen the series. Please refer to the statement below for inquiries from the media or the publicity group representing the production company:

- "NASA did not participate in the production of Moonbase 8, nor did we consult on the content. For more information about NASA's preparation and plans for lunar exploration, including landing the first woman and next man on the Moon by 2024, please see our website."

International Space Station 20th Anniversary of Continuous Crews

Nov. 2 is the 20th year of continuous human presence living off planet aboard the International Space Station.

- NASA and its partners have successfully supported humans living in space aboard the International Space Station since the Expedition 1 crew of Commander William Shepherd, Sergei Krikalev, and Yuri Gidzenko arrived Nov. 2, 2000.
- A truly global endeavor, the unique microgravity laboratory has hosted 241 people from 19 countries, almost 3,000 experiments from over 4,200 researchers in more than 108 countries and areas, and a variety of international and commercial spacecraft.
- The space station is facilitating the growth of a robust commercial market in low-Earth orbit for research, technology development, and crew and cargo transportation and remains the sole space-based proving ground and stepping stone for achieving the goals of the Artemis lunar exploration program.
- Conducting science in the unique orbiting laboratory provides an unparalleled capability to address the challenges of moving humanity toward the Moon and Mars and increase knowledge of engineering and physical sciences, biology, the Earth, and the universe.
- NASA's successful partnerships with Northrop Grumman, Sierra Nevada Corporation and SpaceX to provide commercial cargo resupply paved the way for commercial crew partnerships with Boeing and SpaceX to develop and operate a new generation of spacecraft and launch

systems to launch American astronauts from the United States on American spacecraft to the International Space Station, enabling NASA to focus on building spacecraft and rockets for missions to the Moon and Mars.

- The U.S. International Space Station National Laboratory enables commercial industry, the private sector, academic institutions, non-NASA U.S. government agencies and other diverse users to access a unique research platform for developing and demonstrating new technologies, treatments, and products for improving life on Earth.
- The International Space Station is the blueprint for American leadership in global cooperation, enabling a U.S.-led multinational partnership to advance shared goals in space exploration.
- As NASA develops missions to the Moon and on to Mars, NASA has opened the International Space Station for commercial business and is implementing a five-point plan to help enable U.S. industry to apply its innovation and ingenuity to build and expand a thriving commercial economy in low-Earth orbit.
- Specific Examples of the Benefits from the International Space Station
    - Understanding how our bodies change in microgravity: When humans head to Mars, we need to know what challenges we face. Long-term stays aboard the space station have uncovered unexpected ways that the human body changes in microgravity. For example, space studies have contributed greatly to our knowledge of bone and muscle loss in astronauts and in people on Earth dealing with diseases such as osteoporosis.
    - Stimulating the low-Earth orbit economy: From satellite deployment to in-space research, a vibrant commercial space economy has developed, with a value that now exceeds $345 billion. The space station has been a key part of supporting that growth. We continue to expand the opportunities for commercial companies to use the space station to do business to stimulate a sustainable economy in low-Earth orbit.
    - Fundamental disease research: Alzheimer's Disease. Parkinson's Disease. Cancer. Asthma. Heart Disease. If any of these conditions have impacted your life, so has space station research. For example, protein crystal growth experiments conducted aboard the space station have provided insights into numerous disease treatments, from cancer to Duchenne Muscular Dystrophy.
    - Deployment of CubeSats from station: CubeSats are one of the smallest types of satellites and provide a cheaper way to perform science and technology demonstrations in space. More than 250 CubeSats have now been deployed from station, jumpstarting research and satellite companies like Planet.
    - Discovery of steadily burning cool flames: While burning fuel droplets in the Flame Extinguishing Experiment (FLEX) study, something unexpected occurred. A heptane fuel droplet appeared to extinguish, but actually continued to burn without a visible flame. Our understanding of combustion in space will contribute to the safety of future space missions as well as potentially improving the efficiency of combustion on Earth.
    - Monitoring our planet from a unique perspective: The capacity to host varying complements of instruments, both internal and external, has evolved the station into a robust platform for researchers studying Earth's water, air, land masses, vegetation, and more. The International Space Station provides a unique vantage point different than the other Earth-observing satellites. At 51 degrees inclination and a 90-minute orbit, the station affords a unique perspective with an altitude of

more than 250 miles (400 kilometers) and an orbital path over 90 percent of the Earth's population. This can provide improved spatial resolution and variable lighting conditions compared to the sun-synchronous orbits of typical Earth remote-sensing satellites.

NASA Agency Economic Impact Report

NASA commissioned a study of the economic impact of its Moon to Mars program for fiscal year 2019 to better understand how its activities impacted the American economy. The FY 2019 study was completed by the Nathalie P. Voorhees Center for Neighborhood and Community Improvement at the University of Illinois at Chicago, and NASA made the study public Sept. 25.The agency will perform an economic impact study every two years.

- With an investment of just one-half of 1% of the federal budget, NASA generates more than $64.3 billion in total economic output annually.
- In pursuit of its mission to discover and expand knowledge for the benefit of humanity, the agency produced an economic benefit equal to three times its $21.5 billion budget in FY2019.
- NASA employment and spending supports more than 312,000 jobs nationwide.
- NASA generates an estimated $7 billion in federal, state, and local taxes throughout the United States.
- Every state in the country benefits economically through NASA. Forty-three states have an economic impact of more than $10 million. Of those 43 states, eight have an economic impact of $1 billion or more.
- The agency's Moon to Mars program, funded at $4.9 billion for FY2019, supports more than 69,000 jobs and provides $14 billion in economic output and $1.5 billion in tax revenue. We anticipate these figures to double by 2021. There is $4.9 billion in cost in FY2019 as compared to a budget projection of $10.8 billion in FY2021.
- The average annual wage supported by NASA is $75,657, whereas the national average is $62,977 in comparable sectors.
- The wage data is a direct reflection of the highly skilled labor needed to fulfill the nation's space exploration goals. In addition to engineers and scientists so often associated with the space agency's work force, the data references specialized skills including IT operations, electronic equipment, software operations, research and development, manufacturing, education, administration and management.
- Approximately 22% of NASA's economic impacts are attributable to its Moon to Mars program, which includes NASA's Artemis program.
- According to a 2019 report by the Space Foundation, 81 nations are active in space, employing more than one million people, and accounting for more than $85 billion in annual spending. The global space economy has grown to more than $400 billion.
- NASA had more than 700 active international agreements for various scientific research and technology development activities in FY2019. The International Space Station, representing 15 nations and five space agencies, has a predominant role in the agency's international partnerships.
- NASA spinoff technologies provide an impact on American lives beyond dollars and jobs. For example, engineers at JPL developed, in just 37 days, a ventilator specifically for COVID-19 patients and, after securing an emergency use authorization from the Food and Drug Administration, made the design available to select manufacturers at no cost.

- Alabama, Colorado, Florida, Texas, California, Utah, Ohio, Virginia, Louisiana, and Mississippi account for 96% of all Moon to Mars economic impacts, with Alabama, Colorado and Utah enjoying the largest concentration of those economic benefits.
- NASA initiatives and programs, along with the many other technologies required to make it all possible, represent a significant investment in our nation's industrial base and manufacturing capabilities, research and education endeavors, and national technology development. As of result of NASA missions, our 2019 tech transfer activities produced more than 1,800 new technology reports, filed 85 new patent applications, had 122 patents issued, and establish more than 2,600 software usage agreements.

Artemis Phase I Plan

On Sept. 21, NASA publicly shared an update on its Artemis program, including the latest Phase 1 plans to land the first woman and the next man on the surface of the Moon in 2024.

- Since accepting the challenge to accelerate our return to the Moon, NASA's Artemis program is well underway. We have all the key hardware and contracts in plan to ensure we return to the Moon within four years and establish sustainable exploration by the end of the decade.
- Phase 1 of our Artemis exploration plans includes all robotic and human activities on and around the Moon. NASA will launch two flights tests of the Space Launch System rocket and Orion spacecraft before the Artemis III mission, which will include using a commercial human landing system to send astronauts to the surface of the Moon.
- Artemis is a 21st century lunar exploration program that includes all of NASA's science, technology and human spaceflight plans on and around the Moon throughout this decade.
- With contributions from each of our NASA centers across the nation, American industry and a growing number of international partners, Artemis is humanity's return to the Moon.
- Built with commercial and international partners, the Gateway is part of the backbone of our long-term exploration plans on and around the Moon. NASA is on track to launch the integrated power and propulsion element and habitation and logistics outpost in 2023.
- Our Artemis Phase 1 Plan complements our Lunar Sustainability Concept report issued earlier this year and together these products best outline our plan to date on how we will use the Moon to prepare for our next giant leap – human exploration of Mars as early as the 2030s.
- A crewed lunar landing by 2024 is key to a successful Moon to Mars exploration approach. The United States leads in space exploration now, and as more and more countries and companies take aim at the Moon, America needs the soonest possible landing date to maintain and build on that leadership.
- Each human landing system partner is making incredible progress during this initial base period toward developing their systems for exploration. NASA will decide in February 2021 on which design(s) we'll move forward with for the 2024 lunar landing.
- Landing on the Moon within four years will better focus everyone on the engineering, technology development, and process establishment necessary to safely and successfully carry out sustained human exploration of the Moon.
- Ahead of a human return to the Moon, NASA will deliver dozens of science instruments and technology demonstrations to the lunar surface through its Commercial Lunar Payload Services initiative beginning with two flights in 2021.

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Fiscal Year 2021 NASA Budget
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- This is a 21st Century budget worthy of 21st Century space exploration – one of the strongest budgets in NASA's history.
- The President's budget this year invests more than $25 billion dollars for America's future in space – one that will see the return of **human spaceflight to American soil** for the first time in almost a decade and advances ***Artemis***, while still supporting NASA's full suite of science, aeronautics, and technology work.
- This budget keeps us on the road to land the first woman and the next man on the **Moon by 2024** and, with support of the **Gateway**, helps prepare us for exploration of **Mars** and beyond.
- The President has directed over $3 billion dollars toward development of a **human lunar landing** system. The first time we have had direct funding for a human lander since Apollo.
- The budget fully supports our **Space Launch System** rocket, **Orion** spacecraft, and the systems needed for the first flights of Artemis to quickly, and safely get to the Moon, and test the systems needed to push forward to America's next giant leap – sending astronauts to explore Mars.
- The funding proposed represents an increase of about **12% over last year's request**, and we know it comes at a time of constrained resources for the federal government.
- In Science, the budget **supports the decadal priorities** such a Mars sample return mission, Europa Clipper, and development of new Earth observation missions.
- This budget positions NASA to continue leading the expansion of a vital **low-Earth orbit economy** for the United States through **commercial and international partnerships**, while also setting us on course to lead the way toward a sustainable presence on the Moon and eventual human exploration of Mars.
- Additional Points
    - This budget fully supports the next steps needed to push us to the Moon and beyond, but it doesn't do it at the expense of NASA's other priorities.
    - The President fully supports the International Space Station, as well as returning the launch of American astronauts on American rockets from American soil. This is the year we put America back in the human spaceflight business to stay.
    - As we know, technology powers exploration, and this budget invests in critical, reusable systems needed to get us to the Moon, Mars, and beyond, including next-generation robotics and crew habitats.
    - In Aeronautics, the budget supports our goal of commercial supersonic aircraft research and our critical investments in Unmanned Aerial System Technologies to make flying with commercial and private aircraft safer and more efficient in the 21st Century.
    - This budget secures American leadership in space and focuses on the agency's core missions of exploration, scientific discovery, cutting-edge technology, and aerospace investments with strong bipartisan support in Congress.
    - NASA's vital work takes place at every field center and in every state, stimulating economies, creating good paying jobs, and improving life every day here on Earth.
    - We will transfer and grow this successful commercial economy NASA created for low-Earth orbit to the Moon and beyond.
    - With this budget, NASA harnesses America's commercial innovation to do things never before done. NASA plans to partner with private industry to accelerate our

human lunar landing plan and develop the Gateway, and send science and technology missions to the lunar surface.
- And we will continue to inspire new generations of explorers and use every opportunity to engage educators, students, and the public to explore new frontiers and launch new dreams as part of a new "Artemis Generation." Join us.

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Earth
NASA uses the vantage point of space to understand and explore our home planet, improve lives and safeguard our future.
Tagline: **Your Home. Our Mission.**

Flight
NASA explores new technologies to make aircraft quieter and faster, get you gate-to-gate safely and on time, and transform aviation into a new economic engine at all altitudes.
Tagline: **NASA is With You When You Fly.**

Humans in Space
NASA leads human space exploration in low-Earth orbit with commercial and international partners to enable missions to the Moon and Mars. International Space Station missions are a catalyst for economic development and the advancement of scientific knowledge and new technologies that improve our lives.
Tagline: **Leading Discovery, Improving Life on Earth.**

Moon to Mars
NASA is leading a sustainable return to the Moon with commercial and international partners to expand human presence in space and bring back new knowledge and opportunities.
Tagline: Moon Lights the Way.

Solar System & Beyond
NASA is exploring our Solar System and beyond, uncovering worlds, stars, and cosmic mysteries near and far with our powerful fleet of space and ground-based missions.
Tagline: **Discovering the Secrets of the Universe.**

Space Tech
NASA technologies advance capabilities for space exploration, promote America's global leadership in innovation and transform the world around us.
Tagline: **Technology Drives Exploration.**

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RECENT HOT TOPICS

NASA Statement on Axiom Private Space Crew Announcement

On Jan. 26, Axiom Space announced it's proposing to send four private astronauts to the International Space Station no earlier than January 2022. Below is NASA's response to the public and media who ask for NASA comment:

- Axiom's plans for private astronaut missions directly support NASA's broad strategy to enable U.S. entities to build a sustainable commercial economy in low-Earth orbit. NASA is working with Axiom Space on a formal agreement to enable private astronaut missions to the International Space Station, with further discussions underway to agree on and authorize Axiom Mission 1 (Ax-1), its proposed private astronaut mission. When those agreements are completed, NASA will continue to work with Axiom and the International Space Station partners to approve the proposed crew and enable the first private astronaut mission to the space station.

Human Landing System Contract Extensions

Below is our response to the public and media who call for NASA comment about the agency's Human Landing System contract terms being extended from Feb. 28, 2021 to Apr. 30, 2021:

- Developing the human landing system (HLS) is a key component of successfully executing crewed demonstration missions to the lunar surface under the Artemis program. On Jan. 27, NASA notified its HLS contractors that a no-cost extension to each of their base period contracts will be required. The current 10-month base period contracts were set to conclude Feb. 28, 2021, and the agency plans to execute contract modifications to extend that period of performance through April 30, 2021. The timing of this extension is designed to allow NASA to complete the Option A evaluation, selection and award process and to preserve the ability to seamlessly transition from the base period contracts to the Option A contracts.

  However, NASA may not need the full extension period to complete those activities, in which case the agency will execute Option A awards and transition to Option A performance as soon as the source selection has concluded. This extension is an administrative change and allows the three selected U.S. companies to continue HLS design and development activities as set forth in the firms' base period contracts, awarded in May 2020.

  NASA is committed to establishing a sustained lunar presence, and this procurement action is consistent with the agency's strategy to uphold that commitment. HLS awards under the Next Space Technologies for Exploration Partnerships (NextSTEP-2) Appendix H Broad Agency Announcement are firm-fixed price, milestone-based contracts.

SolarWinds Cyberattack

Below is the latest statement we're providing media who call for comment about the SolarWinds cyberattack:

- On Dec. 13, the Cybersecurity and Infrastructure Security Agency (CISA) issued Emergency Directive 21-01 calling for all federal civilian agencies to review their

networks for indicators of compromise and disconnect or power down SolarWinds Orion products immediately. A thorough and complete investigation into the SolarWinds cybersecurity incident is a top NASA priority. There are indications that some NASA SolarWinds Orion servers may have been affected. NASA continues to work closely with other Federal cybersecurity partners, including DHS/CISA, during our ongoing analysis and mitigation efforts to secure NASA's data and network.

Roscosmos Gateway Participation Media Reports

Below is our response to the public and media who ask for NASA comment about media reports that Russia's space agency isn't interested in joining the Gateway lunar orbital outpost for the Artemis program:

- Together with our international and industry partners, we will establish a long-term human presence on and around the Moon in the next decade. The cooperation between NASA, Roscosmos, and other space agencies has been instrumental in the long-term success of the International Space Station. We are eager to extend the relationships and lessons learned from the space station as we build the Gateway, which will form the cornerstone of sustainable lunar operations while demonstrating key technologies and processes for a historic human mission to Mars. We haven't yet received any specific proposals from Roscosmos responding to NASA's proposal of a Gateway agreement, but we remain open to discussing concepts for cooperation.

Green Run SLS Testing Update

NASA provided the following update Jan. 29 on the Space Launch System "Green Run" testing:

- NASA plans to conduct a second Green Run hot fire test as early as the fourth week in February with the Space Launch System (SLS) rocket's core stage that will launch the Artemis I mission to the Moon. The Green Run is a comprehensive assessment of the rocket's core stage prior to launching Artemis missions.
- While the first hot fire test (Jan. 16) marked a major milestone for the program with the firing of all four RS-25 engines together for the first time for about a minute, it ended earlier than planned. After evaluating data from the first hot fire and the prior seven Green Run tests, NASA and core stage lead contractor Boeing determined that a second, longer hot fire test should be conducted and would pose minimal risk to the Artemis I core stage while providing valuable data to help certify the core stage for flight.
- Inspections showed the core stage hardware, including its engines, and the B-2 test stand are in excellent condition after the first hot fire test, and no major repairs are needed to prepare for a second hot fire test at NASA's Stennis Space Center in Bay St. Louis, Mississippi.
- All SLS rockets use the same core stage design, so a second Green Run hot fire will reduce risk for not only Artemis I, but also for all future SLS missions. The Green Run series of tests is designed to certify the core stage design and verify that the new stage is ready for flight. The hot fire test is the final Green Run test and will provide valuable data that minimizes risk for American deep space exploration missions for years to come.
- The Green Run team scrutinized data from the first hot fire test and determined that a second hot fire lasting approximately at least four minutes would provide significant data to help verify the core stage is ready for flight. The second hot fire test is planned for

about eight minutes to simulate the time amount of time it will take to send the rocket to space following launch.

- Conducting a second hot fire test will allow the team to repeat operations from the first hot fire test and obtain data on how the core stage and the engines perform over a longer period that simulates more activities during the rocket's launch and ascent.
- After the second hot fire test, it will take about a month to refurbish the core stage and its engines. Then, the Pegasus barge will transport the core stage to NASA's Kennedy Space Center in Florida where it will be assembled with the other parts of the SLS rocket and the Orion spacecraft being prepared for the Artemis I launch later this year.
- The core stage design will be used for all configurations of the SLS rocket, the most powerful rocket NASA has ever built, and the series of eight tests will verify the stage is ready for the first and future Artemis lunar missions.
- With the Artemis program, NASA is working to land the first woman and next man on the Moon in 2024 and for the first time, establish sustainable exploration by the end of the decade in preparation for the next giant leap, sending astronauts to Mars.
- NASA's new era of human spaceflight in deep space is powered by the Space Launch System rocket – it will send astronauts aboard the Orion spacecraft farther in lunar orbit than ever before to dock at the Gateway or with a modern human landing system. These systems are the backbone of our exploration plans.

NASA and the Biden Administration

The following are comments for media or the public asking for reaction from NASA about the new Biden Administration:

- NASA enjoys bipartisan support of our science mission, aeronautics research, technology development, and human exploration goals, and we look forward to continuing America's exploration plans on behalf of the Biden Administration.
- In a Jan. 20 message to the NASA workforce, Acting Administrator Steve Jurczyk and Senior White House Appointee Bhavya Lal announced some initial appointments from the Biden-Harris Administration: Alicia Brown has been named NASA's Associate Administrator for Legislative Affairs and Intergovernmental Affairs (OLIA), and Marc Etkind will be the Associate Administrator for Communications.
- Vice President Kamala Harris at the Celebration of America event on Jan. 20 made a reference to space exploration in her remarks:
    - "Even in dark times — We not only dream. We do. We not only see what has been, we see what can be. **We shoot for the moon, and then we plant our flag on it.** We are bold, fearless, and ambitious. We are undaunted in our belief that we shall overcome, that we will rise up. This is American Aspiration."
- In symbolic recognition of earlier generations' ambitions and accomplishments, and support for America's current Moon to Mars exploration approach, a Moon rock now sits in the Oval Office of the White House. At the request of the incoming Biden Administration, NASA loaned the Moon rock that was put on display in the Oval Office Jan. 20.

2020 Global Temperatures

On Jan. 14, climate researchers from NASA and the National Oceanic and Atmospheric Administration (NOAA) released their annual assessment of global temperatures.

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- Earth's global average surface temperature in 2020 tied with 2016 as the warmest year on record, according to an analysis by NASA.
- Continuing the planet's long-term warming trend, the year's globally averaged temperature was 1.84 degrees Fahrenheit (1.02 degrees Celsius) warmer than the baseline 1951-1980 mean, according to scientists at NASA's Goddard Institute for Space Studies (GISS) in New York. 2020 edged out 2016 by a very small amount, within the margin of error of the analysis, making the years effectively tied for the warmest year on record.
- "The last seven years have been the warmest seven years on record, typifying the ongoing and dramatic warming trend," said GISS Director Gavin Schmidt. "Whether one year is a record or not is not really that important – the important things are long-term trends. With these trends, and as the human impact on the climate increases, we have to expect that records will continue to be broken."
- Tracking global temperature trends provides a critical indicator of the impact of human activities – specifically, greenhouse gas emissions – on our planet. Earth's average temperature has risen more than 2 degrees Fahrenheit (1.2 degrees Celsius) since the late 19th century.
- Understanding such long-term climate trends is essential for the safety and quality of human life, allowing humans to adapt to the changing environment in ways such as planting different crops, managing our water resources and preparing for extreme weather.
- A separate, independent analysis by the National Oceanic and Atmospheric Administration (NOAA) concluded that 2020 was the second-warmest year in their record, behind 2016. NOAA scientists use much of the same raw temperature data in their analysis, but have a different baseline period (1901-2000) and methodology. Unlike NASA, NOAA also does not infer temperatures in polar regions lacking observations, which accounts for much of the difference between NASA and NOAA records.
    - Like all scientific data, these temperature findings contain a small amount of uncertainty – in this case, mainly due to changes in weather station locations and temperature measurement methods over time. The GISS temperature analysis (GISTEMP) is accurate to within 0.1 degrees Fahrenheit with a 95 percent confidence level for the most recent period.
- NASA measures Earth's vital signs from land, air, and space with a fleet of satellites, as well as airborne and ground-based observation campaigns. The agency develops new ways to observe and study Earth's interconnected natural systems with long-term data records and computer analysis tools to better see how our planet is changing. NASA shares this unique knowledge with the global community and works with institutions in the United States and around the world that contribute to understanding and protecting our home planet.
- NASA's full surface temperature data set – and the complete methodology used to make the temperature calculation – are available at: https://data.giss.nasa.gov/gistemp

Ames Scientist Pleads Guilty

Acting U.S. Attorney Audrey Strauss announced Jan. 13 that Meyya Meyyappan – a scientist at Ames Research Center -- pleaded guilty in federal court in New York to one count of making false statements. Below is our response to media who call for NASA comment:

- Please contact the NASA Office of Inspector General or the Department of Justice regarding this inquiry.

NASA Agency Economic Impact Report

NASA commissioned a study of the economic impact of its Moon to Mars program for fiscal year 2019 to better understand how its activities impacted the American economy. The FY 2019 study was completed by the Nathalie P. Voorhees Center for Neighborhood and Community Improvement at the University of Illinois at Chicago, and NASA made the study public Sept. 25. The agency will perform an economic impact study every two years.

- With an investment of just one-half of 1% of the federal budget, NASA generates more than $64.3 billion in total economic output annually.
- In pursuit of its mission to discover and expand knowledge for the benefit of humanity, the agency produced an economic benefit equal to three times its $21.5 billion budget in FY2019.
- NASA employment and spending supports more than 312,000 jobs nationwide.
- NASA generates an estimated $7 billion in federal, state, and local taxes throughout the United States.
- Every state in the country benefits economically through NASA. Forty-three states have an economic impact of more than $10 million. Of those 43 states, eight have an economic impact of $1 billion or more.
- The agency's Moon to Mars program, funded at $4.9 billion for FY2019, supports more than 69,000 jobs and provides $14 billion in economic output and $1.5 billion in tax revenue. We anticipate these figures to double by 2021. There is $4.9 billion in cost in FY2019 as compared to a budget projection of $10.8 billion in FY2021.
- The average annual wage supported by NASA is $75,657, whereas the national average is $62,977 in comparable sectors.
- The wage data is a direct reflection of the highly skilled labor needed to fulfill the nation's space exploration goals. In addition to engineers and scientists so often associated with the space agency's work force, the data references specialized skills including IT operations, electronic equipment, software operations, research and development, manufacturing, education, administration and management.
- Approximately 22% of NASA's economic impacts are attributable to its Moon to Mars program, which includes NASA's Artemis program.
- According to a 2019 report by the Space Foundation, 81 nations are active in space, employing more than one million people, and accounting for more than $85 billion in annual spending. The global space economy has grown to more than $400 billion.
- NASA had more than 700 active international agreements for various scientific research and technology development activities in FY2019. The International Space Station, representing 15 nations and five space agencies, has a predominant role in the agency's international partnerships.
- NASA spinoff technologies provide an impact on American lives beyond dollars and jobs. For example, engineers at JPL developed, in just 37 days, a ventilator specifically for COVID-19 patients and, after securing an emergency use authorization from the Food and Drug Administration, made the design available to select manufacturers at no cost.

- Alabama, Colorado, Florida, Texas, California, Utah, Ohio, Virginia, Louisiana, and Mississippi account for 96% of all Moon to Mars economic impacts, with Alabama, Colorado and Utah enjoying the largest concentration of those economic benefits.
- NASA initiatives and programs, along with the many other technologies required to make it all possible, represent a significant investment in our nation's industrial base and manufacturing capabilities, research and education endeavors, and national technology development. As of result of NASA missions, our 2019 tech transfer activities produced more than 1,800 new technology reports, filed 85 new patent applications, had 122 patents issued, and establish more than 2,600 software usage agreements.

Overall Statement about COVID-19 Impacts to NASA

- As the agency navigates its response to COVID-19, NASA leadership continues to prioritize employee health and safety. A majority of the agency's workforce continues to telework, however, agency leadership has developed guidance to assist center leaders in making decisions on how to safely bring back employees to perform mission-critical work on-site to minimize impacts. This guidance takes into account guidelines provided by the White House and the Offices of Personnel Management and Management and Budget, and calls for a controlled, methodical and flexible return to on-site work.

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Space Tech
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RECENT HOT TOPICS

Mary W. Jackson NASA Headquarters Building Naming Ceremony

On Feb. 26, NASA held an official naming ceremony for the agency's headquarters building in Washington, calling it the Mary W. Jackson NASA Headquarters Building, after the first African American female engineer at NASA.

- Mary W. Jackson was part of a group of very important women who helped NASA succeed in getting American astronauts into space. Jackson never accepted the status quo, and helped break barriers and open opportunities for African Americans and women in the field of engineering and technology.
- Jackson's commitment to excellence, diversity, inclusion, and teamwork represents the best of this agency and the future of NASA. Only by embracing an inclusive culture can we live up to NASA's core values of safety, integrity, teamwork, excellence, and the recently added value, inclusion.
- Jackson began working at the National Advisory Committee for Aeronautics (NACA) – the forerunner of NASA – in April 1951. From her initial role as a "human computer" within the segregated West Area Computing Unit of what would become NASA's Langley Research Center in Hampton, Virginia, to becoming NASA's first Black female engineer, to managing Langley's Federal Women's Program and championing equal employment opportunity efforts at the center toward the end of her career, Jackson's pioneering efforts and commitment to helping others have inspired generations – both at NASA and beyond.
- The work of Jackson and others in Langley's West Area Computing Unit caught widespread national attention in the 2016 Margot Lee Shetterly book "Hidden Figures: The American Dream and the Untold Story of the Black Women Mathematicians Who Helped Win the Space Race." The book was made into a popular movie that same year, with award-winning actress Janelle Monáe playing Jackson's character.
- In 2019, Jackson, along with her fellow "Hidden Figures" Katherine Johnson, Dorothy Vaughan, and Christine Darden, were posthumously awarded the Congressional Gold Medal – the highest civilian award – for their work. On June 24, 2020, NASA announced its intent to name the building the Mary W. Jackson NASA Headquarters building.
- The legacy of Jackson and others lives on through NASA's continuing commitment to diversity and inclusion. Jackson's commitment to excellence, diversity, inclusion, and teamwork represents not only the best of NASA's current talent, but also the future of the agency. Embracing an inclusive culture is central to all NASA does and is reflected in the recent addition of inclusion as one of the agency's core values, along with safety, integrity, teamwork, and excellence.

Green Run SLS Testing Update

NASA provided the following update Feb. 26 on the Space Launch System "Green Run" testing:

- NASA and Space Launch System (SLS) core stage prime contractor Boeing are thoroughly examining a liquid oxygen valve inside the stage's engine section in order to identify repairs needed before a second hot fire with the Artemis I stage.
- During preparations for the second hot fire, data indicated the valve was not opening correctly. Technicians installed platforms that allow engineers to access the valve inside

the core stage engine section while the stage remains in the B-2 stand at NASA's Stennis Space Center near Bay St. Louis, Mississippi. After completion of troubleshooting, which will continue over the weekend, NASA will be in a better position to identify a potential date for the second hot fire test.

- This valve, called a pre-valve, must be fully operational during hot fire testing. The valve is part of the core stage main propulsion system, and it helps deliver liquid oxygen propellant flowing from the liquid oxygen tank to an RS-25 engine. For the first hot fire on Jan. 16, all four liquid oxygen pre-valves performed as expected as did all four liquid hydrogen pre-valves.
- The Green Run is a comprehensive series of tests for the SLS core stage before it launches the Artemis missions to the Moon, and the hot fire is the final and most intensive test. The Green Run tests have provided invaluable information on how the new rocket stage operates before it is used to launch the Artemis I mission.
- Check back at this blog for an update on actions needed to resolve the issue, as well as the schedule for the hot fire test. For more information about SLS Green Run, visit https://www.nasa.gov/artemisprogram/greenrun

Fake NASA Mars Images and Videos

Since NASA's Perseverance rover landed on Mars Feb. 18, there has been an increase in Mars-related images and videos posted online being attributed to NASA that aren't the agency's products. Below is our response to the public and media who inquire about particular images and videos that aren't NASA's.

- Space enthusiasts and other image processors are often excited about raw imagery downlinked from NASA spacecraft. Sometimes it is used and altered to create fan-made works shared online. This particular product is one of those examples.

  NASA has extensive image and video databases. Any official NASA news or imagery will be shared via an official agency communications channel. To search our primary imagery database, see: *https://images.nasa.gov*

  For the latest NASA news: *https://www.nasa.gov/news/releases/latest/index.html*

Northrop Grumman CRS-15 Cargo Mission to the International Space Station

Northrop Grumman's next cargo resupply mission to the International Space Station launched Feb. 19 from NASA's Wallops Flight Facility on Wallops Island, Virginia. Cygnus arrived at the space station on Feb. 22 and will stay there until May.

- Northrop Grumman's 15th contract resupply mission under the second Commercial Resupply Services (CRS-15) contract with NASA delivered about 8,000 pounds of cargo to the International Space Station.
- The Cygnus spacecraft carried supplies and payloads, including critical materials to directly support dozens of the more than 250 science, technology demonstrations, and research investigations the Expeditions 64 and 65 crews will conduct.
- Research sent on the Cygnus includes:
  - Spaceborne Computer-2, a high-performance commercial, off-the-shelf computer system being studied to increase data processing speeds for science aboard the space station

    - An experiment to study the advantages of manufacturing artificial retinas in space
    - Micro-16, an investigation studying muscle strength changes in worms to help better understand muscle weakening that astronauts can experience in microgravity.
    - A-HoSS, a radiation detection system developed for the Orion spacecraft and certified for use on NASA's Artemis II mission, the mission to carry a crew of astronauts aboard the spacecraft in orbit around the Moon
- Northrop Grumman named this Cygnus spacecraft after former NASA mathematician and focus of the movie "Hidden Figures," Katherine Johnson. It's the company's tradition to name each Cygnus spacecraft after an individual who has played a pivotal role in human spaceflight. Johnson's hand-written calculations were critical for John Glenn's successful orbital mission around the Earth. This launch also took place on the 59th anniversary of Glenn's launch that Johnson helped make possible.
- Cargo resupply from U.S. companies ensures a national capability to deliver critical science research to the space station, significantly increasing NASA's ability to conduct new investigations at the only laboratory in space.
- The International Space Station is a convergence of science, technology, and human innovation that demonstrates new technologies and enables research not possible on Earth. NASA recently celebrated 20 years of continuous human presence aboard the orbiting laboratory, which has hosted 242 people and a variety of international and commercial spacecraft. The space station remains the springboard to NASA's human spaceflight exploration plans, including future astronaut missions to the Moon and eventually to Mars.

Perseverance Mars Rover Mission Landing

NASA's Mars 2020 mission and its Perseverance rover landed on the Red Planet Feb. 18 at 12:55 p.m. PST (3:55 p.m. EST).

- Mission objectives:
    - Take samples to leave on the surface for return to Earth in a few years. First leg of a round trip to Mars.
    - Search for signs of ancient microbial life as the rover explores a crater that billions of years ago might have been a large body of water like a lake.
    - Characterize the geology and climate of Mars.
    - Help pave the way for human exploration beyond the Moon.
- Key Messages
    - The Perseverance rover is the most capable rover ever sent to Mars and builds on the legacy of NASA's Mars Exploration Program and earlier rovers.
    - The mission embodies our nation's spirit of persevering even in the most challenging of situations, providing inspiration and advancing science and exploration. The mission itself personifies the human ideal of persevering toward the future.
    - The Mars 2020 mission is part of America's larger Moon to Mars exploration approach, which includes astronaut missions to the Moon that prepare for human exploration of the Red Planet.

- NASA is committed to working with our international partners to accomplish stunning achievements in science, technology and exploration, and this mission reinforces those strong bonds.
- Perseverance is the beginning of the first round-trip to another planet. The rover will collect rock and soil samples for return to Earth by future missions that could possibly confirm the ultimate astrobiology question: does life exist, or did it, elsewhere?
- Perseverance carries the most sophisticated suite of instruments ever sent to Mars.
- The mission addresses high-priority science goals to:
  - Return samples from Mars.
  - Search for clues about the potential for past life on Mars.
  - Find out what Mars' environment was like billions of years ago, and what might be preserved in the unique rocks of Jezero Crater.
  - Study what the planet's environment is like today.
- NASA's robotic exploration of Mars is paving the way for future human missions to the Red Planet and will gather knowledge and demonstrate technologies that address the challenges of those human expeditions. Some relevant technologies include:
  - Entry, descent and landing technology.
  - In situ resource use.
  - Terrain-relative navigation.
- NASA's Ingenuity Mars Helicopter is the first aircraft humanity has sent to another world to attempt powered, controlled flight.
- The public will get to ride along. The mission has more cameras than any previous interplanetary mission, and while we have "felt" vibrations in response to wind with the InSight lander's seismometer and "translated" them into sounds that we could hear with the human ear, two microphones on Perseverance will attempt for the first time to hear audio of the rover's operations and travels, as well as the environment at Mars.
- Perseverance joins a fleet that right now includes a rover, a lander and multiple orbiters. This will be the 9th U.S. mission to land and the 5th rover. The U.S. is the only nation to successfully land on Mars.
- Mars is still hard. Only about 46 percent of all missions globally have been successful, and the U.S. is the only nation to land successfully.

Artemis Program's Human Landing Update

During a media interview Feb. 18, acting NASA Administrator Steve Jurczyk said NASA is reviewing the landing the date for the first woman and next man on the Moon as part of the Artemis program.

- The Biden Administration supports the goals of the Artemis program. We fully intend to maintain the continuity of purpose and direction of the Artemis program, and we are excited about next steps.
- We expect no major changes to domestic contracts. We are committed to our international partners in the Artemis mission. We're particularly grateful for the contributions that have been made by our international partners to the Gateway which will enable robust operations on the lunar surface while demonstrating key technologies necessary for a future human mission to Mars.

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- Congress has provided substantial funding for Artemis and NASA's deep space exploration programs. However, given the funding levels for the human landing system over the last two years, a 2024 lunar landing goal does not appear realistic.
- In light of this, we are reviewing the program to ensure Artemis is implemented as quickly, efficiently, and effectively as possible within existing budgetary constraints.
- NASA regularly adjusts its plans to accommodate available budgets, partners, technologies and operational experience, which is what we are doing now and will continue to do throughout the life of the Artemis program
- We are excited to continue down this path.
- Additional points if needed:
    - The goal of this internal review – which will last about two months – is to evaluate the current Artemis program budget and timeline, and develop high level plans that include content, schedule, and budgets for the program.
    - The decision on Human Landing System (HLS) will be made in the next two months.

SolarWinds Cyberattack
Below is the latest statement we're providing the public and media who ask for comment about the SolarWinds cyberattack:

- On Dec. 13, the Department of Homeland Security's Cybersecurity and Infrastructure Security Agency (DHS/CISA) issued Emergency Directive 21-01 calling for all federal civilian agencies to review their networks for indicators of compromise and disconnect or power down SolarWinds Orion products immediately. A thorough and complete investigation into the government-wide SolarWinds cybersecurity incident and any impact to NASA remains a top NASA priority. NASA continues to work closely with other federal cybersecurity partners, including DHS/CISA, during our ongoing analysis. This analysis will take time to complete and therefore, we are unable to comment further at this time about our ongoing investigation.

UAE and China Mars Missions Arrival NASA Comments
On Feb. 9, the United Arab Emirates' first mission to Mars arrived at the Red Planet. On Feb. 10, China's first mission to Mars also arrived. Below are NASA's public comments about both arrivals from Science Mission Directorate Associate Administrator Thomas Zurbuchen on Twitter:

- UAE:
    - "Congratulations @UAEHopeMission on your safe arrival to Mars' orbit! Your bold endeavor to explore the Red Planet will inspire many others to reach for the stars. We hope to join you at Mars soon with @NASAPersevere."
- China:
    - "Congratulations to China for the Tianwen-1 mission successfully entering Mars orbit today. There is much to discover about the mysteries of Mars and we look forward to your contributions!"

NASA Weighs Options for Additional Crew Transport for Spring Space Station Soyuz Flight
On Feb. 9, NASA posted a combined synopsis/solicitation entitled "International Space Station Seat Exchange." The follow is NASA's public statement on the synopsis posted as a web article:

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- A rotating crew of NASA and international astronauts have called the International Space Station home for more than 20 years. To ensure a consistent U.S. presence on the space station through the years, NASA has implemented safeguards to ensure crew transportation is always available.
- NASA now is considering obtaining a supplemental seat on the upcoming spring Soyuz crew rotation mission for a NASA astronaut to add additional capability to the agency's planning.
    - The agency issued a public synopsis to identify all sources that potentially could provide the crew transportation service in the needed timeframe beyond the capability NASA already has in operation with the agency's Commercial Crew Program.
- NASA has been working with Boeing and SpaceX to provide safe and reliable crew transportation to and from the International Space Station. The recent success of NASA's SpaceX Demo-2 mission and the launch and docking of the Crew-1 mission have been significant milestones in providing reliable transportation to the space station on American commercial spacecraft from American soil. The upcoming NASA's SpaceX Crew-2 mission, as well as the second uncrewed flight test for Boeing's Starliner demonstrate continued progress.
- Securing an additional Soyuz seat assures the back-up capability of at least one U.S. crew member aboard the International Space Station in the event of a problem with either spacecraft. NASA is considering providing in-kind services for this supplemental crew transportation service, rather than an exchange of funds.
- It has been NASA's practice to fly mixed crews on spacecraft to ensure safe and continuous operations of the International Space Station.
- Due to operational constraints, crew members must fly to the station and return on the same spacecraft. The crew currently aboard the station (Kate Rubins and the Crew-1 astronauts) must return on Soyuz and Crew Dragon respectively in April/May. NASA's SpaceX Crew-2 is expected to launch as planned April 20. However, if the mission launch is delayed or an event occurs while Crew-2 is in-orbit that requires a premature return, NASA risks not having a U.S. crew member aboard the International Space Station.
- "At NASA, we have a phrase we use often – dissimilar redundancy. That's NASA speak for saying we always have a back-up plan that ensures we have a path forward even if we encounter an issue with our initial approach," said Robyn Gatens, acting director for the International Space Station at NASA Headquarters. "We look forward to the next crew rotation on NASA's SpaceX Crew-2 mission, and we're looking to ensure we can continue to maximize our use of the station and minimize any risk by flying a U.S. astronaut on the upcoming spring Soyuz by providing in-kind services."
- The space station has hosted 242 people and a variety of international and commercial spacecraft. Astronauts and cosmonauts have traveled to and from the orbiting laboratory in the Russian Soyuz spacecraft and NASA's space shuttle until its retirement in 2011.
- Via the public synopsis, NASA aims to determine whether any sources could provide the crew transportation service in the needed timeframe. Submissions are due by Feb. 19.

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Biden Administration Support of Moon to Mars, Artemis
On Feb. 4, White House Press Secretary Jen Psaki answered a reporter question related to NASA's Artemis program and America's Moon to Mars exploration approach. Below is our response when the public and media call for comment:

- The Biden Administration has confirmed its support to advance America's Moon to Mars exploration approach, including NASA's Artemis program that will create sustainable human and robotic exploration on and around the Moon and build to sending astronauts to Mars.

  As White House Press Secretary Jen Psaki said in a briefing Feb. 4, "Through the Artemis program, the United States government will work with industry and international partners to send astronauts to the surface of the Moon." She noted Artemis will land the first woman and next man on the Moon, allow the agency to conduct new and exciting science, and serve as a waypoint to prepare for future missions to Mars.

NASA Senior Climate Advisor
On Feb. 3, NASA announced it has created a new senior climate advisor position.

- In an effort to ensure effective fulfillment of the Biden Administration's climate science objectives for NASA, the agency has established a new position of senior climate advisor. Gavin Schmidt, director of NASA's Goddard Institute for Space Studies in New York, is serving in the role in an acting capacity until a permanent appointment is made.
- Acting NASA Administrator Steve Jurczyk says, "This position will provide NASA leadership critical insights and recommendations for the agency's full spectrum of science, technology, and infrastructure programs related to climate. This will enable the agency to more effectively align our efforts to help meet the administration's goals for addressing climate change."
- Acting NASA Chief of Staff Bhavya Lal says, "The complexities of climate processes still are not fully understood, and climate adaptation and mitigation efforts cannot succeed without robust climate observations, data, and research. The appointment of Gavin Schmidt will help ensure that the Biden Administration has the crucial data to implement and track its plan toward the path to achieve net-zero emissions economy-wide by 2050, and a healthier, safer, more prosperous planet for our children."
- As a representative of the agency's strategic science objectives and accomplishments, the senior climate advisor will advocate for NASA climate investments in the context of broader government agendas and work closely with the White House Office of Science and Technology Policy and the Office of Management and Budget.
- NASA measures Earth's vital signs from land, air, and space with a fleet of satellites, as well as airborne and ground-based observation campaigns. The agency develops new ways to observe and study Earth's interconnected natural systems with long-term data records and computer analysis tools to better see how our planet is changing. NASA shares this unique knowledge with the global community and works with institutions in the United States and around the world that contribute to understanding and protecting our home planet.

Human Landing System Contract Extensions
Below is our response to the public and media who call for NASA comment about the agency's Human Landing System contract terms being extended from Feb. 28, 2021 to Apr. 30, 2021:

- Developing the human landing system (HLS) is a key component of successfully executing crewed demonstration missions to the lunar surface under the Artemis program. On Jan. 27, NASA notified its HLS contractors that a no-cost extension to each of their base period contracts will be required. The current 10-month base period contracts were set to conclude Feb. 28, 2021, and the agency plans to execute contract modifications to extend that period of performance through April 30, 2021. The timing of this extension is designed to allow NASA to complete the Option A evaluation, selection and award process and to preserve the ability to seamlessly transition from the base period contracts to the Option A contracts.

  However, NASA may not need the full extension period to complete those activities, in which case the agency will execute Option A awards and transition to Option A performance as soon as the source selection has concluded. This extension is an administrative change and allows the three selected U.S. companies to continue HLS design and development activities as set forth in the firms' base period contracts, awarded in May 2020.

  NASA is committed to establishing a sustained lunar presence, and this procurement action is consistent with the agency's strategy to uphold that commitment. HLS awards under the Next Space Technologies for Exploration Partnerships (NextSTEP-2) Appendix H Broad Agency Announcement are firm-fixed price, milestone-based contracts.

NASA Agency Economic Impact Report

NASA commissioned a study of the economic impact of its Moon to Mars program for fiscal year 2019 to better understand how its activities impacted the American economy. The FY 2019 study was completed by the Nathalie P. Voorhees Center for Neighborhood and Community Improvement at the University of Illinois at Chicago, and NASA made the study public Sept. 25. The agency will perform an economic impact study every two years.

- With an investment of just one-half of 1% of the federal budget, NASA generates more than $64.3 billion in total economic output annually.
- In pursuit of its mission to discover and expand knowledge for the benefit of humanity, the agency produced an economic benefit equal to three times its $21.5 billion budget in FY2019.
- NASA employment and spending supports more than 312,000 jobs nationwide.
- NASA generates an estimated $7 billion in federal, state, and local taxes throughout the United States.
- Every state in the country benefits economically through NASA. Forty-three states have an economic impact of more than $10 million. Of those 43 states, eight have an economic impact of $1 billion or more.
- The agency's Moon to Mars program, funded at $4.9 billion for FY2019, supports more than 69,000 jobs and provides $14 billion in economic output and $1.5 billion in tax revenue. We anticipate these figures to double by 2021. There is $4.9 billion in cost in FY2019 as compared to a budget projection of $10.8 billion in FY2021.
- The average annual wage supported by NASA is $75,657, whereas the national average is $62,977 in comparable sectors.

- The wage data is a direct reflection of the highly skilled labor needed to fulfill the nation's space exploration goals. In addition to engineers and scientists so often associated with the space agency's work force, the data references specialized skills including IT operations, electronic equipment, software operations, research and development, manufacturing, education, administration and management.
- Approximately 22% of NASA's economic impacts are attributable to its Moon to Mars program, which includes NASA's Artemis program.
- According to a 2019 report by the Space Foundation, 81 nations are active in space, employing more than one million people, and accounting for more than $85 billion in annual spending. The global space economy has grown to more than $400 billion.
- NASA had more than 700 active international agreements for various scientific research and technology development activities in FY2019. The International Space Station, representing 15 nations and five space agencies, has a predominant role in the agency's international partnerships.
- NASA spinoff technologies provide an impact on American lives beyond dollars and jobs. For example, engineers at JPL developed, in just 37 days, a ventilator specifically for COVID-19 patients and, after securing an emergency use authorization from the Food and Drug Administration, made the design available to select manufacturers at no cost.
- Alabama, Colorado, Florida, Texas, California, Utah, Ohio, Virginia, Louisiana, and Mississippi account for 96% of all Moon to Mars economic impacts, with Alabama, Colorado and Utah enjoying the largest concentration of those economic benefits.
- NASA initiatives and programs, along with the many other technologies required to make it all possible, represent a significant investment in our nation's industrial base and manufacturing capabilities, research and education endeavors, and national technology development. As of result of NASA missions, our 2019 tech transfer activities produced more than 1,800 new technology reports, filed 85 new patent applications, had 122 patents issued, and establish more than 2,600 software usage agreements.

AGENCY COMMUNICATION THEME PRIORITIES

For full key points and other products for all themes, visit: https://communications.nasa.gov.

Earth

NASA uses the vantage point of space to understand and explore our home planet, improve lives and safeguard our future.
Tagline: **Your Home. Our Mission.**

Flight

NASA explores new technologies to make aircraft quieter and faster, get you gate-to-gate safely and on time, and transform aviation into a new economic engine at all altitudes.
Tagline: **NASA is With You When You Fly.**

Humans in Space

NASA leads human space exploration in low-Earth orbit with commercial and international partners to enable missions to the Moon and Mars. International Space Station missions are a catalyst for economic development and the advancement of scientific knowledge and new technologies that improve our lives.
Tagline: **Leading Discovery, Improving Life on Earth.**

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Moon to Mars
NASA is leading a sustainable return to the Moon with commercial and international partners to expand human presence in space and bring back new knowledge and opportunities.
Tagline: Moon Lights the Way.

Solar System & Beyond
NASA is exploring our Solar System and beyond, uncovering worlds, stars, and cosmic mysteries near and far with our powerful fleet of space and ground-based missions.
Tagline: **Discovering the Secrets of the Universe.**

Space Tech
NASA technologies advance capabilities for space exploration, promote America's global leadership in innovation and transform the world around us.
Tagline: **Technology Drives Exploration.**

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NASA INTERVIEW PREP DOCUMENT

RECENT HOT TOPICS

Quick Reference

Upcoming Events
Public Dates

NASA's Ingenuity Mars Helicopter

On March 23, NASA held a news conference where the agency announced it's targeting no earlier than April 8 for the Ingenuity Mars Helicopter to make the first attempt at powered, controlled flight of an aircraft on another planet. The 4-pound (1.8-kilogram) experimental rotorcraft was carried to the Red Planet on NASA's Perseverance Mars rover.

- Ingenuity Key points:
  - Ingenuity will be the first aircraft to attempt controlled flight on another planet (a "Wright Brothers" moment).
  - Ingenuity has already demonstrated feats of engineering – shrinking its size and mass, working with specialized materials, demonstrating flight in a thin atmosphere while still on Earth.
  - Tests on Earth have already proven many of its engineering principles.
  - If Ingenuity succeeds, future Mars exploration could include an ambitious aerial dimension.
  - Ingenuity is a technology demonstration. Its experimental mission is separate from the rover, but we do tech demos because they advance our capabilities and help prove concepts for future mission.
- Ingenuity's technology demonstration objectives are:
  - Prove powered flight in the thin atmosphere of Mars.
    - The Red Planet has lower gravity (about one-third that of Earth) but its atmosphere is just 1% as thick, making it much harder to generate lift.
  - Demonstrate miniaturized flying technology.
    - That requires shrinking down onboard computers, electronics and other parts so that the helicopter is light enough to take off.
  - Operate autonomously.
    - Ingenuity will use solar power to charge its batteries and rely on internal heaters to maintain operational temperatures during the cold Martian nights. After receiving commands from Earth relayed through the rover, each test flight is performed without real-time input from Mars Helicopter mission controllers.
- NASA's Perseverance Mars rover mission objectives are:
  - Take samples to leave on the surface for return to Earth in a few years. First leg of a round trip to Mars.
  - Search for signs of ancient microbial life as the rover explores a crater that billions of years ago might have been a large body of water like a lake.
  - Characterize the geology and climate of Mars.
  - Help pave the way for human exploration beyond the Moon.
- Perseverance Mars rover Key Points:
  - The Perseverance rover is the most capable rover ever sent to Mars and builds on the legacy of NASA's Mars Exploration Program and earlier rovers.
  - The mission embodies our nation's spirit of persevering even in the most challenging of situations, providing inspiration and advancing science and

exploration. The mission itself personifies the human ideal of persevering toward the future.

- The Mars 2020 mission is part of America's larger Moon to Mars exploration approach, which includes astronaut missions to the Moon that prepare for human exploration of the Red Planet.
- NASA is committed to working with our international partners to accomplish stunning achievements in science, technology and exploration, and this mission reinforces those strong bonds.
- Perseverance is the beginning of the first round-trip to another planet. The rover will collect rock and soil samples for return to Earth by future missions that could possibly confirm the ultimate astrobiology question: does life exist, or did it, elsewhere?
- Perseverance carries the most sophisticated suite of instruments ever sent to Mars.
- The mission addresses high-priority science goals to:
  - Return samples from Mars.
  - Search for clues about the potential for past life on Mars.
  - Find out what Mars' environment was like billions of years ago, and what might be preserved in the unique rocks of Jezero Crater.
  - Study what the planet's environment is like today.
- NASA's robotic exploration of Mars is paving the way for future human missions to the Red Planet and will gather knowledge and demonstrate technologies that address the challenges of those human expeditions. Some relevant technologies include:
  - Entry, descent and landing technology.
  - In situ resource use.
  - Terrain-relative navigation.
- The public will get to ride along. The mission has more cameras than any previous interplanetary mission, and while we have "felt" vibrations in response to wind with the InSight lander's seismometer and "translated" them into sounds that we could hear with the human ear, two microphones on Perseverance will attempt for the first time to hear audio of the rover's operations and travels, as well as the environment at Mars.
- Perseverance joins a fleet that right now includes a rover, a lander and multiple orbiters. This is the 9th U.S. mission to land and the 5th rover. The U.S. is the only nation to successfully land on Mars.

NASA Statement on Nomination of Bill Nelson for Agency Administrator

Acting NASA Administrator Steve Jurczyk released on March 19 the following statement about the nomination by President Joe Biden of Bill Nelson to serve as the 14th NASA administrator:

- "I'm pleased President Biden has nominated former U.S. Senator Bill Nelson to lead our agency. Bill has a proven history of supporting our work here at NASA, and has helped advance America's position in human exploration, science, aeronautics, and technology. While the Senate must confirm the nomination, I look forward to continuing to work with Bill and the Biden-Harris administration to carry out NASA's many critical missions in the years to come.

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- "The men and women at NASA are an incredible national asset and will continue to take on the most pressing issues facing our country. As we look to the future – and with Bill at the helm – we will continue to take on and find solutions to problems once thought unsolvable, and educate and inspire the next generation of American scientists, engineers, and workers."
- Background:
    - Nelson represented Florida in the Senate from 2001-19 where he served as ranking member on the Commerce, Science, and Transportation Committee. Previously, he represented Florida's 9th and 11th Congressional Districts in the U.S. House of Representatives. While chair of the House space subcommittee, Nelson flew aboard the space shuttle Columbia as a payload specialist on the STS-61C mission in 1986. He was appointed to the NASA Advisory Council by former NASA Administrator Jim Bridenstine in May 2019.

Green Run SLS Hot Fire Test
Teams successfully carried out a "Green Run" hot fire test on NASA's Space Launch System rocket core stage on March 18.

- The largest rocket element NASA has ever built, the core stage of NASA's Space Launch System (SLS) rocket, fired its four RS-25 engines for 8 minutes and 19 seconds on March 18 at NASA's Stennis Space Center near Bay St. Louis, Mississippi. The successful test, known as a hot fire, is a critical milestone ahead of the agency's Artemis I mission, which will send an uncrewed Orion spacecraft on a test flight around the Moon and back to Earth, paving the way for future Artemis missions with astronauts.
- Engineers designed the eight-part Green Run test campaign to gradually bring the SLS core stage to life for the first time, culminating with the hot fire. The team will use data from the tests to validate the core stage design for flight.
- "The SLS is the most powerful rocket NASA has ever built, and during today's test the core stage of the rocket generated more than 1.6 million pounds of thrust within seven seconds. The SLS is an incredible feat of engineering and the only rocket capable of powering America's next-generation missions that will place the first woman and the next man on the Moon," said acting NASA Administrator Steve Jurczyk. "Today's successful hot fire test of the core stage for the SLS is an important milestone in NASA's goal to return humans to the lunar surface – and beyond."
- NASA previously conducted a hot fire test of the SLS core stage Jan. 16. The four RS-25 engines fired together for the first time for about one minute before the test ended earlier than planned. Following data analysis, NASA determined a second, longer hot fire test would provide valuable data to help verify the core stage design for flight, while posing minimal risk to the Artemis I core stage.
- During the second hot fire test, the stage fired the engines for a little more than eight minutes, just like it will during every Artemis launch to the Moon. The longer duration hot fire tested a variety of operational conditions, including moving the four engines in specific patterns to direct thrust and powering the engines up to 109% power, throttling down and back up, as they will during flight.
- Testing the SLS rocket's core stage is a combined effort for NASA and its industry partners. Boeing is the prime contractor for the core stage and Aerojet Rocketdyne is the prime contractor for the RS-25 engines.

- Next, the core stage for SLS will be refurbished, then shipped to NASA's Kennedy Space Center in Florida. There, the core stage will be assembled with the solid rocket boosters and other parts of the rocket and NASA's Orion spacecraft on the mobile launcher inside the Vehicle Assembly Building at Kennedy in preparation for Artemis I.
- SLS, Orion, and the ground systems at Kennedy, along with the human landing system and the Gateway in orbit around the Moon, are NASA's backbone for deep space exploration. SLS is the only rocket that can send Orion, astronauts, and supplies to the Moon on a single mission.
- The exploration of the Moon with NASA's Artemis program includes preparations to send astronauts to Mars as part of America's Moon to Mars exploration approach.

Europa Clipper Launch Service RFP
NASA has posted to sam.gov a Europa Clipper Launch Service request for proposal. Below is our response to the public and media who call for NASA comment about the RFP:

- NASA analysis concluded torsional loads relative to the powerful Space Launch System (SLS) rocket exceed the Clipper design specifications for payload environment. As both the Clipper and SLS cargo configuration designs matured, it was determined the interactions between the two vehicles produced an unexpected payload environment relative to an aero dynamic interaction during ascent.

  Given this torsional loads analysis combined with limited SLS near term availability relative to high priority Artemis missions and critical Europa Clipper schedule considerations, the agency decision was to utilize an alternative launch option for this near term science mission consistent with provisions in the FY 2021 Consolidated Appropriations Act.
- Future Flight of science missions using the powerful Space Launch System rocket is anticipated to fully take advantage of its incredible capabilities.

Russia and China Lunar Station NASA Comment
On March 9, Russia and China signed a memorandum of understanding (MOU) on cooperative construction of an international lunar research station. Below is our response to the public and media who call for NASA comment:

- NASA is working with its international and industry partners to establish a long-term human presence on and around the Moon. The cooperation between NASA, Roscosmos, and other space agencies has been instrumental in the long-term success of the International Space Station. We are eager to extend the relationships and lessons learned from the International Space Station as we build the Gateway, which will form the cornerstone of sustainable lunar operations while demonstrating key technologies and processes for a historic human mission to Mars. While Roscosmos has informed NASA that it does not wish to be part of the Gateway partnership at this time, they offered to explore interoperability, and we welcome such a discussion.
- Regarding the Gateway airlock, if asked: Gateway planning remains unchanged for the addition of an airlock to Gateway in 2028. NASA will be pursuing other options for the provider of the Gateway airlock, including considering new or expanding existing international partnerships.

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U.S. Russia Sanctions Possible NASA Impacts
Below is our response to public and media questions about whether recent U.S. sanctions related to Russia will impact civil space cooperation:

- NASA looks forward to continuing its longstanding relationship with Roscosmos on areas of mutual civil space cooperation. Acting NASA Administrator Steve Jurczyk and Roscosmos General Director Dmitry Rogozin held a productive introductory call on Feb. 25, during which they discussed civil space cooperation, including on the International Space Station, as well as updates on developments at the two agencies, including plans for activities in cislunar space and on the Moon.

International Space Station Seat Exchange (ISE) Contract
On March 9, NASA announced it has signed a contract with a U.S. commercial company Axiom Space of Houston to fly a NASA astronaut on an upcoming Soyuz rotation on Soyuz MS-18, scheduled to launch April 9. Below is our response statement for the public and media who call for comment:

- To ensure continuous U.S. presence aboard the International Space Station, NASA has signed a contract with a U.S. commercial company to fly a NASA astronaut on an upcoming Soyuz rotation in exchange for a seat on a future U.S. commercial spacecraft.

  NASA astronaut Mark Vande Hei will launch on the Soyuz MS-18 spacecraft in April. NASA will continue to work with Axiom Space of Houston to fly a non-NASA astronaut the company designates on a U.S. commercial spacecraft as part of a space station crew rotation mission expected to occur in the 2023 timeframe.

Mary W. Jackson NASA Headquarters Building Naming Ceremony
On Feb. 26, NASA held an official naming ceremony for the agency's headquarters building in Washington, calling it the Mary W. Jackson NASA Headquarters Building, after the first African American female engineer at NASA.

- Mary W. Jackson was part of a group of very important women who helped NASA succeed in getting American astronauts into space. Jackson never accepted the status quo, and helped break barriers and open opportunities for African Americans and women in the field of engineering and technology.
- Jackson's commitment to excellence, diversity, inclusion, and teamwork represents the best of this agency and the future of NASA. Only by embracing an inclusive culture can we live up to NASA's core values of safety, integrity, teamwork, excellence, and the recently added value, inclusion.
- Jackson began working at the National Advisory Committee for Aeronautics (NACA) – the forerunner of NASA – in April 1951. From her initial role as a "human computer" within the segregated West Area Computing Unit of what would become NASA's Langley Research Center in Hampton, Virginia, to becoming NASA's first Black female engineer, to managing Langley's Federal Women's Program and championing equal employment opportunity efforts at the center toward the end of her career, Jackson's pioneering efforts and commitment to helping others have inspired generations – both at NASA and beyond.
- The work of Jackson and others in Langley's West Area Computing Unit caught widespread national attention in the 2016 Margot Lee Shetterly book "Hidden Figures: The American Dream and the Untold Story of the Black Women Mathematicians Who

Helped Win the Space Race." The book was made into a popular movie that same year, with award-winning actress Janelle Monáe playing Jackson's character.

- In 2019, Jackson and fellow "Hidden Figures" Katherine Johnson, Dorothy Vaughan, and Christine Darden were awarded the Congressional Gold Medal – the highest civilian award – for their work. On June 24, 2020, NASA announced its intent to name the building the Mary W. Jackson NASA Headquarters building.
- The legacy of Jackson and others lives on through NASA's continuing commitment to diversity and inclusion. Jackson's commitment to excellence, diversity, inclusion, and teamwork represents not only the best of NASA's current talent, but also the future of the agency. Embracing an inclusive culture is central to all NASA does and is reflected in the recent addition of inclusion as one of the agency's core values, along with safety, integrity, teamwork, and excellence.

Webb Telescope Name Statement

On March 1, Scientific American posted an opinion letter entitled, "NASA Needs to Rename the James Webb Space Telescope." Below is our response to public & media who call for comment:

- NASA is aware of concerns that have arisen about James E. Webb, and we are working with historians to examine his role in government. NASA named its next generation observatory, the James Webb Space Telescope, after its second administrator, who helped establish the Apollo Program that landed humans on the Moon. The agency made the naming decision in recognition of Webb's role in retaining an active science program at NASA in the agency's early years. Webb's work as administrator laid the groundwork for today's accomplishments, and science remains a critical part of NASA's work: to understand the universe, advance exploration, and inspire the next generation.

Artemis Program's Human Landing Update

During a media interview Feb. 18, acting NASA Administrator Steve Jurczyk said NASA is reviewing the landing the date for the first woman and next man on the Moon as part of the Artemis program.

- The Biden Administration supports the goals of the Artemis program. We fully intend to maintain the continuity of purpose and direction of the Artemis program, and we are excited about next steps.
- We expect no major changes to domestic contracts. We are committed to our international partners in the Artemis mission. We're particularly grateful for the contributions that have been made by our international partners to the Gateway which will enable robust operations on the lunar surface while demonstrating key technologies necessary for a future human mission to Mars.
- Congress has provided substantial funding for Artemis and NASA's deep space exploration programs. However, given the funding levels for the human landing system over the last two years, a 2024 lunar landing goal does not appear realistic.
- In light of this, we are reviewing the program to ensure Artemis is implemented as quickly, efficiently, and effectively as possible within existing budgetary constraints.
- NASA regularly adjusts its plans to accommodate available budgets, partners, technologies and operational experience, which is what we are doing now and will continue to do throughout the life of the Artemis program
- We are excited to continue down this path.
- Additional points if needed:

- The goal of this internal review – which will last about two months – is to evaluate the current Artemis program budget and timeline, and develop high level plans that include content, schedule, and budgets for the program.
- The decision on Human Landing System (HLS) will be made in the next two months.

SolarWinds Cyberattack
Below is the latest statement we're providing the public and media who ask for comment about the SolarWinds cyberattack:

- On Dec. 13, the Department of Homeland Security's Cybersecurity and Infrastructure Security Agency (DHS/CISA) issued Emergency Directive 21-01 calling for all federal civilian agencies to review their networks for indicators of compromise and disconnect or power down SolarWinds Orion products immediately. A thorough and complete investigation into the government-wide SolarWinds cybersecurity incident and any impact to NASA remains a top NASA priority. NASA continues to work closely with other federal cybersecurity partners, including DHS/CISA, during our ongoing analysis. This analysis will take time to complete and therefore, we are unable to comment further at this time about our ongoing investigation.

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UPCOMING EVENTS PUBLIC DATES

Below are the publicly listed dates of high-profile activities/events/milestones in 2021. Internal planning, target, and pre-decisional dates are not listed below as they're not official and public yet. The public dates listed are as specific as they can be, at this time. This list will be regularly updated and added to, as appropriate.

- **Ingenuity First Flight – targeted April 8:** Ingenuity Mars Helicopter's first test flight
- **Expedition 65 – April 9:** Crew launch to space station from Kazakhstan
- **Earth Day – April 22:** NASA celebrates Earth Day, Highlights Climate Support
- **SpaceX Crew-2 – April 22:** Crew launches to station from Florida
- **Human Landing System - By end of April:** NASA selects one or two American HLS designs to move forward with development
- **SpaceX Crew-1 – Late April/early May:** NASA's SpaceX Crew-1 returns to Earth
- **Space Launch System Core Stage Arrival at Kennedy: Expected in April**
- **State of NASA – Expected Spring 2021:** Following Administration's full budget request to Congress, agency hosts annual State of NASA activities at Kennedy Space Center *(previous full budget announcements in May)*
- **New NASA Administrator (and eventually Deputy Administrator) Swearing in – TBD pending Senate Confirmation**
- **SpaceX CRS-22 – Summer 2021:** Next commercial resupply services mission to space station from Florida
- **Northrop Grumman CRS-16 – July 2021:** Commercial resupply services mission to space station from Virginia
- **X-57 – Aug. 15:** Taxi tests begin for NASA's first all-electric plane, X-57, at Armstrong Flight Research Center
- **Landsat 9 – September:** NASA and U.S. Geological Survey launch latest Earth observation satellite, Landsat 9, from California
- **Boeing's Crew Flight Test – September:** Boeing's CFT earliest possible launch to space station from Florida
- **CAPSTONE – Fall 2021:** NASA CubeSat to validate new navigation technologies and verify dynamics in Gateway's planned orbit will launch to space
- **Imaging X-Ray Polarimetry Explorer – Fall 2021:** NASA's IXPE mission to discover hidden astronomical objects in the universe launches from Florida
- **SpaceX CRS-23 – Fall 2021:** Commercial resupply services mission to space station from Florida
- **SpaceX Crew-3 – Fall 2021:** Crew will launch to station from Florida
- **SpaceX Crew-2 Return – Fall 2021:** Crew returns to Earth
- **Lucy – Oct 16:** NASA's Lucy mission to study the Trojan asteroids of Jupiter will launch from Florida
- **Webb Telescope – Oct. 31:** NASA's James Webb Space Telescope to help answer questions about our cosmic origins launches from French Guiana
- **DART – Nov. 24:** Window opens to launch Double Asteroid Redirection Test from California, NASA's first flight demonstration for planetary defense
- **Webb Telescope – November:** The James Webb Space Telescope completes mission deployments/arrives in its L2 (second Lagrange Point) orbit about 29 days after launch
- **Artemis I - November:** NASA reviewing launch date for first integrated flight test of the uncrewed Space Launch System rocket and Orion spacecraft launches on a multi-week mission around the Moon

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- **Orion splashdown:** NASA's Orion spacecraft splashes down on Earth following a multi-week mission around the Moon
- **Geostationary Operational Environmental Satellite-T – December:** NASA and NOAA's latest weather satellite, GOES-T, launches from Florida
- **Intuitive Machines' CLPS Flight – Late 2021:** Suite of robotic NASA payloads sent lunar surface as part of a Commercial Lunar Payload Services delivery. Landing takes place in the following weeks
- **Astrobotic's CLPS Flight – Late 2021:** Suite of robotic NASA payloads sent to the lunar surface as part of a Commercial Lunar Payload Services delivery. Landing takes place in the following weeks
- **Boeing Orbital Flight Test-2 – Under review:** NASA evaluating new target date for the CST-100 Starliner's OFT-2 launch to station from Florida (*It's public knowledge the launch cannot take place in April, and a new launch date is under review)*
- **Boeing Starliner-1 – Under review pending outcome of OFT-2:** Launch date for first operational Boeing commercial crew launch to space station from Florida
- **Laser Comm – 2021:** NASA's Laser Communications Relay Demonstration to test optical communications launches from Florida
- **Astronaut Candidates – 2021**: NASA will announce selections for the next class of astronaut candidates to begin training

AGENCY COMMUNICATION THEME PRIORITIES
For full key points and other products for all themes, visit: https://communications.nasa.gov.

Earth
NASA uses the vantage point of space to understand and explore our home planet, improve lives and safeguard our future.
Tagline: **Your Home. Our Mission.**

Flight
NASA explores new technologies to make aircraft quieter and faster, get you gate-to-gate safely and on time, and transform aviation into a new economic engine at all altitudes.
Tagline: **NASA is With You When You Fly.**

Humans in Space
NASA leads human space exploration in low-Earth orbit with commercial and international partners to enable missions to the Moon and Mars. International Space Station missions are a catalyst for economic development and the advancement of scientific knowledge and new technologies that improve our lives.
Tagline: **Leading Discovery, Improving Life on Earth.**

Moon to Mars
NASA is leading a sustainable return to the Moon with commercial and international partners to expand human presence in space and bring back new knowledge and opportunities.
Tagline: Moon Lights the Way.

Solar System & Beyond
NASA is exploring our Solar System and beyond, uncovering worlds, stars, and cosmic mysteries near and far with our powerful fleet of space and ground-based missions.
Tagline: **Discovering the Secrets of the Universe.**

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Space Tech
NASA technologies advance capabilities for space exploration, promote America's global leadership in innovation and transform the world around us.
Tagline: **Technology Drives Exploration.**

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OIG Artemis Status Report

On April 19, the NASA Office of Inspector General released its Artemis Status Update report. The audit does not contain any recommendations or a formal agency response, but below is what we're using with calls for comment:

- The Biden Administration and a bipartisan Congress support the goals of the Artemis program. The president's recent funding request gives us the resources to continue to advance America's Moon to Mars exploration plans. Full budget details will be released later.
- NASA has shipped the Space Launch System rockets core stage and its attached four engines to the agency's Kennedy Space Center in Florida. There, the core stage will be assembled with the solid rocket boosters and other parts of the rocket and NASA's Orion spacecraft on the mobile launcher inside the Vehicle Assembly Building at Kennedy in preparation for Artemis I.
    - NASA still has launch opportunities for the Artemis I mission later this year and remains on track for an Artemis II mission in 2023. Timelines for the Artemis III missions and beyond are under review.
- The agency is reviewing the program to ensure Artemis is implemented as quickly, efficiently, and effectively as possible within existing budgetary constraints.
- The goal of this internal review is to evaluate the current Artemis program budget and timeline, and develop high level plans that include content, schedule, and budgets for the program.
    - NASA will discuss its Artemis review findings during a future discussion once the Administration releases its detailed budget for the agency.
- With NASA's Space Launch System rocket and Orion spacecraft, as well as U.S. commercial partnerships with the human landing system and Gateway lunar outpost, we will send astronauts to the Moon and provide learning opportunities for future missions.
- Responses to NASA's proposal to launch the agency's Europa Clipper were due April 16. Future flight of science missions using the powerful Space Launch System rocket is anticipated to fully take advantage of its incredible capabilities.

Reports of Russia Leaving the International Space Program

On April 19, media reported the Russian space agency Roscosmos will leave the International Space Station Program in 2025. Below is our public and media response:

- The Russians have confirmed their participation in the International Space Station Program through at least 2024, as have NASA and the Japanese, European and Canadian space agencies. NASA and Roscosmos have and will continue to work closely as partners to safely conduct International Space Station operations. Please contact Roscosmos for any specifics on its future plans.

Artemis Program and Sustainability

For use when talking about the long-term exploration of the Moon under the Artemis program and America's larger Moon to Mars exploration approach:

- NASA's long-term goal has always been to send humans to Mars – and we will use the Moon to help us get there. This is America's Moon to Mars exploration approach.

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- Throughout the 2020s, the Artemis program will lay the foundation for a sustained long-term presence on the lunar surface. We will use the Moon to validate deep space systems and operations before embarking on a human voyage to Mars.
- NASA's Artemis program is well underway. The agency has all the key hardware and contracts in plan to ensure we return to the Moon quickly and establish sustainable exploration by the end of the decade. The Space Launch System rocket, Orion spacecraft, human landing system and Gateway are the backbone of our deep space exploration plans.
- NASA will build the key surface infrastructure elements needed for a sustained lunar presence on the Moon at the lunar South Pole, anchoring a lunar development zone that enables science investigations, technology demonstrations and economic activity.
    - A lunar terrain vehicle or LTV would transport crew around the landing zone
    - The habitable mobility platform would enable crews to take trips across the Moon lasting up to 45 days
    - A lunar foundation surface habitat would house as many as four crew members on shorter surface stays
- Astronauts working on the lunar surface could test advanced robotics, as well as a wide set of new technologies identified in the Lunar Surface Innovation Initiative, focusing on development in areas including in-situ resource utilization (ISRU) and power systems.
- Rovers will carry a variety of instruments including ISRU experiments that will generate information on the availability and extraction of usable resources (e.g., oxygen and water). Advancing these technologies could enable the production of fuel, water, and/or oxygen from local materials, enabling sustainable surface operations with decreasing supply needs from Earth.
- Built with commercial and international partners, the Gateway is part of the backbone of our long-term exploration plans on and around the Moon. NASA will launch the integrated power and propulsion element and habitation and logistics outpost no later than May 2024.
- For long-term sustainability, the Gateway provides a staging point for human and robotic lunar operations. As the Gateway's capabilities grow, NASA and its partners will see a commensurate boost in science and technology demonstrations on orbit and on the surface. The Gateway enables increased mission durations, creating opportunity for longer stays on the lunar surface and potentially multiple surface expeditions deployed from the Gateway during a single mission.
- The first human mission back on the Moon will last approximately seven days. NASA plans to send Artemis Generation astronauts on increasingly longer missions about once per year thereafter, conducting missions on both the surface and aboard Gateway.
- America is closer today than at any other time in our history since the Apollo program to returning to the Moon.
- America's return to the Moon begins later this year with two commercial robotic landers delivering 16 new NASA science instruments and technology development payloads. The agency plans for about two robotic deliveries to the Moon per year.
- NASA outlined its lunar surface sustainability concept in a report on April 2, 2020.
- While human exploration of Mars is possible in the coming years, NASA is developing many of the technologies needed to send humans farther into the solar system today. Our work at the Moon will prepare us for that next giant leap sending astronaut to Mars.

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NASA's SpaceX Crew-2 Mission Launch to the International Space Station
On April 23, SpaceX launched NASA's SpaceX Crew-2 mission to the International Space Station from the agency's Kennedy Space Center in Florida. Crew-2's docking to the space station is scheduled for 5:10 a.m. EDT Saturday, April 24.

- NASA's SpaceX Crew-2 mission is the second commercial crew rotation flight
  - NASA astronaut Shane Kimbrough, spacecraft commander
  - NASA Astronaut Megan McArthur, pilot
  - JAXA (Japan Aerospace Exploration Agency) astronaut Akihiko Hoshide mission specialist
  - ESA (European Space Agency) astronaut Thomas Pesquet mission specialist
- Crew-2 continues the increase of expedition crew members on the space station, maximizing crew time for science and research.
- There are a number of "firsts" with Crew-2's launch and arrival at the space station:
  - First mission flying two international partners
  - First commercial crew handover on the space station
  - First reuse of Crew Dragon and Falcon 9 for a crew mission:
    - Crew Dragon Endeavour flew the historic Demo-2 mission in 2020
    - Falcon 9 flew astronauts on Crew-1 mission
  - First time two commercial crew spacecraft will be docked to the station
- Visiting spacecraft during Crew-2 includes: Northrop Grumman Cygnus, SpaceX cargo Dragon, Boeing CST-100 Starliner (uncrewed flight) and SpaceX Crew-3
- NASA's partnership with American private industry is changing the arc of human spaceflight history by opening access to low-Earth orbit and the International Space Station to more people, more science, and more commercial opportunities.
- NASA is using the International Space Station to conduct cutting-edge research and technology development to help prepare to send the first woman and person of color to the Moon through the Artemis program and then use what we learn there to take the next giant leap – sending astronauts to Mars.

NASA's Ingenuity Mars Helicopter
On April 19, NASA's Ingenuity Mars Helicopter successfully completed the first attempt at powered, controlled flight of an aircraft on another planet. The experimental rotorcraft was carried to the Red Planet on NASA's Perseverance Mars rover. Ingenuity completed a more complex second flight on April 22, with a third flight targeted for Sunday, April 25.

- Ingenuity Key points:
  - Ingenuity is the first aircraft to attempt and achieve controlled flight on another planet (a "Wright Brothers" moment).
  - Ingenuity had already demonstrated feats of engineering – shrinking its size and mass, working with specialized materials, demonstrating flight in a thin atmosphere while still on Earth.
  - Tests on Earth proved many of its engineering principles.
  - With Ingenuity's success, future Mars exploration could include an ambitious aerial dimension.
  - Ingenuity is a technology demonstration. Its experimental mission is separate from the rover, but we do tech demos because they advance our capabilities and help prove concepts for future mission.
- Ingenuity's technology demonstration objectives are:

  - Prove powered flight in the thin atmosphere of Mars.
    - The Red Planet has lower gravity (about one-third that of Earth) but its atmosphere is just 1% as thick, making it much harder to generate lift.
  - Demonstrate miniaturized flying technology.
    - That requires shrinking down onboard computers, electronics and other parts so that the helicopter is light enough to take off.
  - Operate autonomously.
    - Ingenuity will use solar power to charge its batteries and rely on internal heaters to maintain operational temperatures during the cold Martian nights. After receiving commands from Earth relayed through the rover, each test flight is performed without real-time input from Mars Helicopter mission controllers.
- NASA's Perseverance Mars rover mission objectives are:
  - Take samples to leave on the surface for return to Earth in a few years. First leg of a round trip to Mars.
  - Search for signs of ancient microbial life as the rover explores a crater that billions of years ago might have been a large body of water like a lake.
  - Characterize the geology and climate of Mars.
  - Help pave the way for human exploration beyond the Moon.
- Perseverance Mars rover Key Points:
  - The Perseverance rover is the most capable rover ever sent to Mars and builds on the legacy of NASA's Mars Exploration Program and earlier rovers.
  - The mission embodies our nation's spirit of persevering even in the most challenging of situations, providing inspiration and advancing science and exploration. The mission itself personifies the human ideal of persevering toward the future.
  - The Mars 2020 mission is part of America's larger Moon to Mars exploration approach, which includes astronaut missions to the Moon that prepare for human exploration of the Red Planet.
  - NASA is committed to working with our international partners to accomplish stunning achievements in science, technology and exploration, and this mission reinforces those strong bonds.
  - Perseverance is the beginning of the first round-trip to another planet. The rover will collect rock and soil samples for return to Earth by future missions that could possibly confirm the ultimate astrobiology question: does life exist, or did it, elsewhere?
  - Perseverance carries the most sophisticated suite of instruments ever sent to Mars.
  - The mission addresses high-priority science goals to:
    - Return samples from Mars.
    - Search for clues about the potential for past life on Mars.
    - Find out what Mars' environment was like billions of years ago, and what might be preserved in the unique rocks of Jezero Crater.
    - Study what the planet's environment is like today.
  - NASA's robotic exploration of Mars is paving the way for future human missions to the Red Planet and will gather knowledge and demonstrate technologies that address the challenges of those human expeditions. Some relevant technologies include:

        - Entry, descent and landing technology.
        - In situ resource use.
        - Terrain-relative navigation.
    - The public will get to ride along. The mission has more cameras than any previous interplanetary mission, and while we have "felt" vibrations in response to wind with the InSight lander's seismometer and "translated" them into sounds that we could hear with the human ear, two microphones on Perseverance will attempt for the first time to hear audio of the rover's operations and travels, as well as the environment at Mars.
    - Perseverance joins a fleet that right now includes a rover, a lander and multiple orbiters. This is the 9th U.S. mission to land and the 5th rover. The U.S. is the only nation to successfully land on Mars.
    - On April 20, a toaster-size experimental instrument aboard Perseverance called the Mars Oxygen In-Situ Resource Utilization Experiment (MOXIE) converted some of the Red Planet's thin, carbon dioxide-rich atmosphere into oxygen – the first time this has ever been done.
        - While the technology demonstration is just getting started, it could pave the way for science fiction to become science fact – isolating and storing oxygen on Mars to help power rockets that could lift astronauts off the planet's surface. Such devices also might one day provide breathable air for astronauts themselves.

Earth Day 2021
Earth Day is on Thursday, April 22. NASA will celebrate Earth Day 2021 virtually. This year's Earth Day theme is focused on connectivity – how Earth's systems are connected and how people are connected to and through the planet.

- NASA is a leader in Earth and climate science, advancing our understanding of the planet.
- NASA's research is essential to help the future of Earth. NASA's investment in space – both the unique Earth science we conduct from orbit and the technology we've developed by living in space and exploring our solar system and universe – returns benefits every day to people around the world who are working to protect and sustain Earth's environment.
- One of the best places to observe the impacts of climate change is from the sky. Thanks to that unique vantage point, we can better understand the human-induced climate change over time, and how it interacts with Earth's natural processes.
- Understanding Earth gives us the means to better protect it. NASA works with other government agencies, academia and industry, as well as with international partners to gain new and deeper understanding of Earth systems.
- NASA Aeronautics is expanding climate change research for sustainable aviation by developing and testing new green technologies for next generation aircraft, new automation tools for greener airspace operations, and sustainable energy options for aircraft propulsion.
- Here are some examples of how NASA is helping the environment today:
    - U.S. air quality warnings of human exposure to particulate pollution are now more accurate thanks to the use of NASA satellite data.

- NASA Earth observations and technology are being used to help farmers and other growers conserve water and energy for more sustainable agriculture.
- NASA satellite data are being used to help protect wildlife and endangered species on land and sea, from songbirds in New England to Atlantic sturgeon in the Delaware Bay and blue whales in the Pacific Ocean.
- NASA Aeronautics is partnering with industry to accomplish the aviation community's aggressive climate change agenda to reduce greenhouse gas emissions by half by 2050, compared to 2005, and achieve net-zero emissions by 2060.

Human Landing System Award

On April 16, NASA announced it picked SpaceX to deliver the next American astronauts from lunar orbit to the surface of the Moon aboard the company's Starship human landing system.

- With an award to develop the human landing system, NASA and our partners will complete the first crewed demonstration mission to the surface of the Moon in the 21st century as part of the Artemis program.
- This contract puts NASA on the path of landing the first woman and first person of color on the Moon under the Artemis program. We look forward to these historic moments.
- The HLS is the final piece of the puzzle to sending the next American astronauts to the lunar surface:
  - The agency's powerful Space Launch System rocket will launch four astronauts aboard the Orion spacecraft for their multi-day journey to lunar orbit.
  - There, two crew members will transfer to Starship HLS for the final leg of their journey to the surface of the Moon. Starship will launch to orbit aboard a SpaceX Super Heavy rocket.
  - After approximately a week exploring the surface, crew will board the lander for their short trip back to orbit where they will return to Orion and their colleagues before heading back to Earth.
- SpaceX has been working closely with NASA experts during the HLS base period of performance to inform its lander design and ensure it meets NASA's performance requirements and human spaceflight standards. A key tenet for safe systems, these agreed-upon standards range from areas of engineering, safety, health and medical technical areas.
- NASA will continue to work closely with SpaceX to build the first commercial HLS, providing insight throughout Starship development and ensuring this system is certified safe for our astronauts.
- The firm-fixed price, milestone-based contract total award value is $2.89 billion. This contract requires also an uncrewed demonstration to the Moon prior to the crewed demonstration mission.
- In addition to this crewed demonstration mission to the Moon, NASA still intends to buy sustainable lunar surface transportation services for long-term exploration of the Moon staged from Gateway. The agency is accelerating a procurement for future crewed Moon missions and will reach out to all of industry soon for input on a path forward.
- With NASA's Space Launch System rocket and Orion spacecraft, as well as U.S. commercial partnerships for the human landing system and Gateway, we will send astronauts to the Moon and provide learning opportunities for future missions.

- While the human landing system award contract calls for a landing as soon as 2024, the agency will send astronauts to the surface of the Moon as soon as it safe to do so.
- The Biden-Harris Administration and a bipartisan Congress support the goals of the Artemis program. The president's recent funding request gives us the resources to continue to advance America's Moon to Mars exploration plan, which includes Artemis.
    - NASA's comprehensive internal Artemis review regarding budget and schedule is ongoing and additional details will be released later.

NASA Statement on Nomination of Pam Melroy for Agency Deputy Administrator
Acting NASA Administrator Steve Jurczyk released on April 16 the following statement about the intended nomination by President Joe Biden of former NASA astronaut Pam Melroy to serve as the agency's deputy administrator:

- "Pam's experience as an astronaut, space shuttle commander, and U.S. Air Force test pilot would bring to NASA a unique perspective on the opportunities and challenges facing the agency. Pam is driven by a desire to solve the biggest issues here on Earth, throughout the solar system, and beyond. She is a proven leader with bold vision and, if confirmed by the Senate, I look forward to working with her and Sen. Nelson to ensure NASA's future success."

  Background Information: One of only two women to command a space shuttle, Melroy logged more than 38 days in space. All three of her missions were assembly missions to build the International Space Station. After serving more than two decades in the Air Force and as a NASA astronaut, Melroy took on a number of leadership roles, including at Lockheed Martin, the Federal Aviation Administration, the Defense Advanced Research Projects Agency, Nova Systems Pty, Australia, and as an advisor to the Australian Space Agency. She currently is an independent consultant and a member of the National Space Council's Users Advisory Group.

Fiscal Year 2022 NASA Blueprint Budget
On April 9, the Biden-Harris Administration released a blueprint budget proposal for Fiscal Year 2022.

- The President's Fiscal Year 2022 budget requests $24.7 billion for NASA, an increase of more than 6% over what the agency received the previous year.

Overarching Points

- This funding request demonstrates the president's commitment to NASA and the people across the agency and its partners who have worked so hard this past year under the most difficult circumstances and achieved unprecedented success.
- We know this increase comes at a time of constrained resources, and we owe it to the president and the American people to be good and responsible stewards of every tax dollar invested in NASA. The NASA workforce and the American people should be encouraged by what they see in this budget request. It is an investment in our future, and it shows confidence in what this agency has to offer.

Supports Human Exploration of the Moon, Mars, and Beyond

- The president's funding request gives us the resources to advance America's bipartisan Moon to Mars space exploration plan, agreed to by the Administration and Congress.
- This request keeps us on the path to landing the first woman and first person of color on the Moon under the Artemis program.

- With NASA's Space Launch System rocket and Orion spacecraft, as well as U.S. commercial partnerships with the human landing system and Gateway lunar outpost, we will send astronauts to the Moon and provide learning opportunities for future missions.

Furthers Robotic Exploration of the Solar System and the Universe

- This funding request also furthers robotic exploration of the solar system and the universe.
- NASA will continue to be a catalyst for the growth of a healthy and vibrant commercial space industry, expanding opportunities in low-Earth orbit and pushing further to the Moon, and beyond.

Enhances Research and Development at NASA

- This funding request supports continued progress developing cutting-edge space technologies, transformative capabilities, and renewable energy, all of which feed the economy and create good paying American jobs.
- We are investing in aviation to make our skies safer, our fuels cleaner, and to get you to your destination faster than ever before. This also includes investing in next-generation aeronautics research that will safely integrate automated aircraft systems with piloted airplanes.

Advances Climate Science

- Given the dangers to humanity posed by climate change, including the economic and national security impacts of this threat, this budget increases our ability to better understand Earth and how it works as an integrated system, from our oceans to our atmosphere and how it all impacts our daily lives.

Builds a Diverse Future STEM Workforce

- This funding request includes new funding for NASA's STEM engagement efforts as part of the Administration's vital strategy to equip our nation with technologies for the future and it invests in and inspires the next generation of scientists, engineers, mathematicians, and explorers by supporting the agency's STEM efforts.

Continues Research on the International Space Station

- With continued support for the International Space Station and the Artemis program, the president welcomes the international community to join us as we push human exploration deeper into space.

FY 2022 Budget Request for NASA Moon Landing Astronauts During Artemis Program

The White House Office of Management and Budget released the FY 2022 discretionary funding request for NASA on April 9. Increasing diversity in STEM fields is a priority of the Biden Administration, as it is for NASA, reflected in updated messaging priorities included in the budget indicating the agency's Artemis program will land the first woman and first person of color on the surface of the Moon.

- Only 12 people have walked on the lunar surface, all were white, American men and most were test pilots. The next generation of moonwalkers will be much more diverse as NASA's Artemis program includes landing the first woman and the first person of color on the Moon. Today, these groups represent a significant contributing portion of all facets of the agency's workforce both from mission capability and workforce diversity considerations. We look forward to the historic moments of the first woman and first person of color walking on the Moon and inspiring all of humanity as we prepare also for our next giant leap, human exploration of Mars.

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- NASA is committed to a culture of diversity and inclusion, where all employees feel welcome, respected, connected, and engaged. The additional messaging reflects ongoing efforts to foster and strengthen a NASA workplace culture that values unity, diversity and inclusion, and equity.
- If asked when and how will NASA ensure the first woman and first person of color will fly on Artemis missions:
    - Our astronaut corps increasingly reflects the diversity of the American public. We are confident we can meet this goal from the Administration to land the first woman and first person of color on the Moon as part of the Artemis program. Specific crew assignments for each mission will be made closer to launch.
- If asked about the first woman astronaut assignment on the first landing mission:
    - NASA still is committed to sending the first woman to the Moon on the next lunar landing mission.
- If asked about the first person of color astronaut assignment:
    - The first person of color also will walk on the Moon as part of the Artemis program. Artemis is a series of missions and any specific crew assignments will be made closer to launch.
- If asked about whether NASA still is targeting the next human landing on the Moon for 2024:
    - Congress has provided substantial funding for Artemis and NASA's deep space exploration programs. However, given the funding levels for the human landing system over the last two years, a 2024 lunar landing goal does not appear realistic. We are reviewing the program to ensure Artemis is implemented as quickly, efficiently, and effectively as possible within existing budgetary constraints.

NASA Statement on Nomination of Bill Nelson for Agency Administrator
Acting NASA Administrator Steve Jurczyk released on March 19 the following statement about the nomination by President Joe Biden of Bill Nelson to serve as the 14th NASA administrator. Sen. Nelson's Senate confirmation hearing was held on April 21.

- "I'm pleased President Biden has nominated former U.S. Senator Bill Nelson to lead our agency. Bill has a proven history of supporting our work here at NASA, and has helped advance America's position in human exploration, science, aeronautics, and technology. While the Senate must confirm the nomination, I look forward to continuing to work with Bill and the Biden-Harris administration to carry out NASA's many critical missions in the years to come.
- "The men and women at NASA are an incredible national asset and will continue to take on the most pressing issues facing our country. As we look to the future – and with Bill at the helm – we will continue to take on and find solutions to problems once thought unsolvable, and educate and inspire the next generation of American scientists, engineers, and workers."
- Background:
    - Nelson represented Florida in the Senate from 2001-19 where he served as ranking member on the Commerce, Science, and Transportation Committee. Previously, he represented Florida's 9th and 11th Congressional Districts in the U.S. House of Representatives. While chair of the House space subcommittee, Nelson flew aboard the space shuttle Columbia as a payload specialist on the

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STS-61C mission in 1986. He was appointed to the NASA Advisory Council by former NASA Administrator Jim Bridenstine in May 2019.

UPCOMING EVENTS PUBLIC DATES

Below are the publicly listed dates of high-profile activities/events/milestones in 2021. Internal planning, target, and pre-decisional dates are not listed below as they're not official and public yet. The public dates listed are as specific as they can be, at this time. This list will be regularly updated and added to, as appropriate. Text in red is newly updated public information:

- **SpaceX Crew-2 – April 24:** Crew docking to the International Space Station
- **SpaceX Crew-1 – April 28:** NASA's SpaceX Crew-1 returns to Earth
- **Space Launch System Core Stage Arrival at Kennedy: Expected Late April** (exact date withheld for security reasons)
- **OSIRIS-REx Departs Asteroid Bennu – May 10:** OSIRIS-REx starts its return journey to Earth with Bennu sample materials
- **State of NASA – Expected Spring 2021:** Following Administration's full budget request to Congress, agency hosts annual State of NASA activities at Kennedy Space Center *(previous full budget announcements in May)*
- **New NASA Administrator and Deputy Administrator Swearing in – TBD pending Senate Confirmation**
- **SpaceX CRS-22 – June 3:** Next commercial resupply services mission to space station from Florida
- **Northrop Grumman CRS-16 – July 2021:** Commercial resupply services mission to space station from Virginia
- **X-57 – Fall 2021 --** Flight test for NASA's first all-electric plane, X-57, at Armstrong Flight Research Center
- **Landsat 9 – September:** NASA and U.S. Geological Survey launch latest Earth observation satellite, Landsat 9, from California
- **Boeing Orbital Flight Test-2 – August/September:** NASA evaluating new target date for the CST-100 Starliner's OFT-2 launch to station from Florida
- **CAPSTONE – Fall 2021:** NASA CubeSat to validate new navigation technologies and verify dynamics in Gateway's planned orbit will launch to space
- **Imaging X-Ray Polarimetry Explorer – Fall 2021:** NASA's IXPE mission to discover hidden astronomical objects in the universe launches from Florida
- **SpaceX CRS-23 – Fall 2021:** Commercial resupply services mission to space station from Florida
- **Lucy – Oct 16:** NASA's Lucy mission to study the Trojan asteroids of Jupiter will launch from Florida
- **SpaceX Crew-3 – No earlier than Oct. 23:** Crew-3 will launch to station from Florida
- **SpaceX Crew-2 Return – No Earlier than Oct. 31:** Crew-2 returns to Earth
- **Webb Telescope – (Launch Readiness Date) Oct. 31:** NASA's James Webb Space Telescope to help answer questions about our cosmic origins launches from French Guiana
- **DART – Nov. 24:** Window opens to launch Double Asteroid Redirection Test from California, NASA's first flight demonstration for planetary defense
- **Webb Telescope – November/December:** The James Webb Space Telescope completes mission deployments/arrives in its L2 (second Lagrange Point) orbit about 29 days after launch

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- **Artemis I - November:** NASA reviewing launch date for first integrated flight test of the uncrewed Space Launch System rocket and Orion spacecraft launches on a multi-week mission around the Moon
- **Orion splashdown:** NASA's Orion spacecraft splashes down on Earth following a multi-week mission around the Moon
- **Geostationary Operational Environmental Satellite-T – December:** NASA and NOAA's latest weather satellite, GOES-T, launches from Florida
- **Intuitive Machines' CLPS Flight – Late 2021:** Suite of robotic NASA payloads sent lunar surface as part of a Commercial Lunar Payload Services delivery. Landing takes place in the following weeks
- **Astrobotic's CLPS Flight – Late 2021:** Suite of robotic NASA payloads sent to the lunar surface as part of a Commercial Lunar Payload Services delivery. Landing takes place in the following weeks
- **Boeing's Crew Flight Test – Under review pending OFT-2:** Boeing's CFT earliest possible launch to space station from Florida
- **Boeing Starliner-1 – Under review pending outcome of earlier flight tests:** Launch date for first operational Boeing commercial crew launch to space station from Florida
- **Laser Comm – 2021:** NASA's Laser Communications Relay Demonstration to test optical communications launches from Florida
- **Astronaut Candidates – 2021**: NASA will announce selections for the next class of astronaut candidates to begin training

AGENCY COMMUNICATION THEME PRIORITIES

For full key points and other products for all themes, visit: https://communications.nasa.gov.

Earth

NASA uses the vantage point of space to understand and explore our home planet, improve lives and safeguard our future.
Tagline: **Your Home. Our Mission.**

Flight

NASA explores new technologies to make aircraft quieter and faster, get you gate-to-gate safely and on time, and transform aviation into a new economic engine at all altitudes.
Tagline: **NASA is With You When You Fly.**

Humans in Space

NASA leads human space exploration in low-Earth orbit with commercial and international partners to enable missions to the Moon and Mars. International Space Station missions are a catalyst for economic development and the advancement of scientific knowledge and new technologies that improve our lives.
Tagline: **Leading Discovery, Improving Life on Earth.**

Moon to Mars

NASA is leading a sustainable return to the Moon with commercial and international partners to expand human presence in space and bring back new knowledge and opportunities.
Tagline: Moon Lights the Way.

Solar System & Beyond

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NASA is exploring our Solar System and beyond, uncovering worlds, stars, and cosmic mysteries near and far with our powerful fleet of space and ground-based missions.
Tagline: **Discovering the Secrets of the Universe.**

Space Tech
NASA technologies advance capabilities for space exploration, promote America's global leadership in innovation and transform the world around us.
Tagline: **Technology Drives Exploration.**

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Fiscal Year 2022 NASA Full Budget Proposal

On May 28, the Biden-Harris Administration released the full budget proposal for Fiscal Year 2022.

- President's Fiscal Year 2022 budget requests $24.8 billion for NASA, an increase of more than 6% over what the agency received the previous year.

Overarching Points

- This funding request demonstrates the president's commitment to NASA and the people across the agency and its partners who have worked so hard this past year under the most difficult circumstances and achieved unprecedented success.
- The NASA workforce and the American people should be encouraged by what they see in this budget request. It is an investment in our future, and it shows confidence in what this agency has to offer. We owe it to the president and the American people to be good and responsible stewards of every tax dollar invested in NASA.
- This budget request includes the strongest NASA budget ever for science, which will help address the climate crisis at home and abroad, as well as advance robotic missions that will pave the way for astronauts to explore the Moon and Mars.
- This is also the strongest budget for exploration since the Apollo program.
- This budget request will restore America's global standing, promote racial and economic equity, and drive economic growth.

Supports Human Exploration of the Moon, Mars, and Beyond

- The president's funding request increases funding for Artemis by $350 million and gives us the resources to advance America's bipartisan Moon to Mars space exploration plan, agreed to by the Administration and Congress.
- This request keeps us on the path toward a regular cadence of Artemis missions with crew to the Moon by the middle of the decade.
- NASA's human landing system contract award, with the goal of a human demonstration mission to the lunar surface by 2024, is under protest.
- NASA is currently reviewing the overall Artemis timeline based on appropriations and expected budget, and outcome of the human landing system protest. We hope to provide an updated Artemis timeline later this year following conclusion of the protest.
- The FY2022 budget request assumes an Artemis I launch no earlier than November 2021, an Artemis II launch no earlier than September 2023, followed by Artemis III targeted for late 2024 and Artemis IV for late 2025. Landing the first woman and first person of color on the lunar surface as part of the Artemis program will promote equity – signaling to every American they too can see themselves among the stars.
- With NASA's Space Launch System rocket and Orion spacecraft, as well as U.S. commercial partnerships with the human landing system and Gateway lunar outpost, we will send astronauts to the Moon to test technologies and exploration practices that will make future missions more productive than ever before.
- This budget funds an upgraded Space Launch System, known as Block1B, that can deliver larger cargos to lunar orbit.

- Gateway, built with our commercial and international partners, is important to sustainable lunar operations.
    - The foundation of our lunar outpost is targeted to launch no earlier than November 2024, with additional modules from our international partners launching later.
- We are working day and night to reduce risks and overcome the challenges of long-term human exploration of the Moon and Mars.
- The budget funds early design work and planning for additional surface architecture necessary including the lunar terrain vehicle and surface habitats to ensure our astronauts can explore more of the Moon than ever before and stay for increasingly longer periods of time in deep space.
- NASA's Lunar Surface Innovation Initiative is advancing technologies to support mission operations on the Moon. This budget includes funding for the preliminary design of a fission surface power system that could power operations on the Moon and Mars.

Furthers Robotic Exploration of the Solar System and the Universe

- This funding request also furthers robotic exploration of the solar system and the universe.
- The budget provides more than $650 million for the Mars Sample Return mission, the highest priority large mission in planetary science.
- It includes strong support for planetary defense, including the near-Earth objects (NEO) Surveyor mission to detect asteroids and comets that could potentially impact Earth.

Enhances Research and Development at NASA

- This funding request supports continued progress developing cutting-edge space technologies, transformative capabilities, and renewable energy, all of which feed the economy and create good paying American jobs.
- Investing in new technologies enhances NASA's missions and fosters the growing space economy.
- NASA routinely demonstrates new technologies, reducing overall risk and encouraging industry adoption. The budget includes $500 million for technology demonstrations.
- It fully funds the On-orbit Servicing, Assembly, and Manufacturing 1 (OSAM-1) mission. Robotically refueling a satellite and manufacturing and assembling spacecraft parts in-orbit will foster a more sustainable space economy.
- Launching next month, our Laser Communications Relay Demonstration will demonstrate a technology that can provide 10-100 times better data rates than commonly used radio frequency communications systems. In the coming years, we'll further refine laser communications technology for use in deep space.
- More than $280 million would be directed toward small business innovation research and technology transfer. The increase of $60 million will provide more money to small companies to research new ideas and develop innovative solutions to challenging problems.
- An investment in NASA and space infrastructure reaffirms our nation is the world's premier partner in space collaboration, and we will be for decades to come.
- We are investing in aviation to make our skies safer, our fuels cleaner, and to get you to your destination faster than ever before. This also includes investing in next-generation

aeronautics research that will safely integrate automated aircraft systems with piloted airplanes.
    - This budget enhances American competitiveness in the global aviation industry including the first two flights of new X-57 and X-59 aircraft.
    - NASA aeronautics is leading transformation of the way people and goods are moved through Advanced Air Mobility (air taxis, drone cargo deliveries, etc.), an emerging market expected to be worth $115 billion a year by 2035.
        - It will help safely deliver revolutionary aviation capabilities to previously underserved local, regional, intraregional, and urban areas. NASA investments today will spur the advancements of tomorrow.
- The budget provides a $30 million increase to accelerate transformative science at the frontiers of biological and physical sciences research in space.

Advances Climate Science

- Climate change has increasing economic and national security impacts, and this budget increases investments in climate research and science programs.
- This funding increases our ability to better understand Earth and how it works as an integrated system, from our oceans to our atmosphere and how it all impacts our daily lives.
- NASA is developing the next-generation Earth System Observatory. NASA's new Earth System Observatory will provide the world with an unprecedented understanding of our Earth's climate system, arming us with next-generation data critical to mitigating climate change, and protecting our communities in the face of natural hazards.
    - The Earth System Observatory will help improve our understanding of extreme weather events and our decision making on climate resilience, adaptation, and mitigation. It will also inform decisions that ensure communities have the resources they need to build resilience prior to these crises.
- Research on zero-emissions aviation
    - NASA Aeronautics is partnering with industry, academia and other agencies through the Sustainable Flight National Partnership to accomplish the aviation community's aggressive climate change agenda. Through advanced vehicle technologies, efficient airline operations and sustainable aviation fuels, collectively NASA and our federal government and industry partners aim to reduce carbon emissions from aviation by half by 2050, compared to 2005, and achieve net-zero emissions by 2060.
- NASA continues to lead the development of new small spacecraft capabilities. For example, small platforms can enable distributed observations for climate science.

Builds a Diverse Future STEM Workforce

- This budget invests in the Artemis Generation. It requests funding for NASA's STEM engagement efforts for the first time in five years to inspire the next generation of scientists, engineers, mathematicians, and explorers by supporting the agency's STEM efforts.
- With this budget, NASA will increase funding for Space Grant and MUREP and will work with university and consortia partners to implement initiatives focused on diversity, equity and inclusion.

- NASA taps into the skills of a diverse group of partners and reaches new groups through our small business programs, academic partnerships, and prizes, challenges, and crowdsourcing activities.
- The Space Technology Mission Directorate is collaborating with OSTEM's Minority University Research and Education Project to offer research planning grants and incentivize partnerships between minority-serving institutions and small businesses, setting them up to apply to NASA opportunities.

Continues Research on the International Space Station

- The space station is a convergence of science, technology, and human innovation that demonstrates new technologies and enables research not possible on Earth. The space station remains the springboard to NASA's next great leap in exploration, including future human missions to the Moon and eventually to Mars.
- With continued support for the International Space Station and the Artemis program, the president welcomes the international community to join us as we push human exploration deeper into space.
- This budget supports early design maturation of multiple commercially owned and operated low-Earth orbit (LEO) destinations (free flyers) from which NASA, along with other customers, can purchase services and stimulate the growth of commercial activities in LEO.
- In addition to maintaining continuous U.S. access to a space station in LEO, these new and more cost-effective platforms will democratize access to space by lowering the barriers to entry for the next generation of researchers, technologists, and tourists.

Earth System Observatory

On May 24, the White House and NASA announced new Earth System Observatory missions to help address and mitigate climate change:

- NASA will design a new set of Earth-focused missions to provide key information to guide efforts related to climate change, disaster mitigation, fighting forest fires, and improving real-time agricultural processes.
- With the Earth System Observatory, each satellite will be uniquely designed to complement the others, working in tandem to create a 3D, holistic view of Earth, from bedrock to atmosphere.
- "I've seen firsthand the impact of hurricanes made more intense and destructive by climate change, like Maria and Irma. The Biden-Harris Administration's response to climate change matches the magnitude of the threat: a whole of government, all hands-on-deck approach to meet this moment," said NASA Administrator Bill Nelson. "Over the past three decades, much of what we've learned about the Earth's changing climate is built on NASA satellite observations and research. NASA's new Earth System Observatory will expand that work, providing the world with an unprecedented understanding of our Earth's climate system, arming us with next-generation data critical to mitigating climate change, and protecting our communities in the face of natural disasters."
- The observatory follows recommendations from the 2017 Earth Science Decadal Survey by the National Academies of Sciences, Engineering and Medicine, which lays out ambitious but critically necessary research and observation guidance.
- Areas of focus for the observatory include:

  - Aerosols: Answering the critical question of how aerosols affect the global energy balance, a key source of uncertainty in predicting climate change.
  - Cloud, Convection, and Precipitation: Tackling the largest sources of uncertainty in future projections of climate change, air quality forecasting, and prediction of severe weather.
  - Mass Change: Providing drought assessment and forecasting, associated planning for water use for agriculture, as well as supporting natural hazard response.
  - Surface Biology and Geology: Understanding climate changes that impact food and agriculture, habitation, and natural resources, by answering open questions about the fluxes of carbon, water, nutrients, and energy within and between ecosystems and the atmosphere, the ocean, and the Earth.
  - Surface Deformation and Change: Quantifying models of sea-level and landscape change driven by climate change, hazard forecasts, and disaster impact assessments, including dynamics of earthquakes, volcanoes, landslides, glaciers, groundwater, and Earth's interior.
- NASA currently is initiating the formulation phase for the observatory.
- Among its first integrated parts is NASA's partnership with the Indian Space Research Organisation (ISRO), which brings together two different kinds of radar systems that can measure changes in Earth's surface less than a half-inch.
  - This capability will be utilized in one of the observatory's first missions intended as a pathfinder, called NISAR (NASA-ISRO synthetic aperture radar).
  - This mission will measure some of the planet's most complex processes such as ice-sheet collapse and natural hazards such as earthquakes, volcanoes, and landslides. NISAR can assist planners and decision makers with managing both hazards and natural resources in the future.

Hurricanes and NASA

June 1 is the official start of hurricane season for the Atlantic Ocean.

- After 2020 brought a record number of named storms in 2020, NASA is once again prepared to help understand and monitor these storms from its unique vantage point of space.
- NASA develops and launches satellites for NOAA, which is the lead federal agency for forecasting hurricanes. But the science of hurricanes doesn't start – or end – with forecasting.
- Global warming is increasing the heat in the ocean basins and already making it more likely that storms will intensify faster and be stronger, a phenomenon NASA scientists continue to study deeply.
- With the challenge posed by climate change, NASA has never been more committed to innovation in Earth science research.
  - Our next-generation Earth System Observatory, announced on May 24, missions will help us understand extreme weather events and other climate-fueled hazards to inform the solutions of the future.
- NASA researchers and data also support U.S. stakeholders before, during and after storms make landfall.
  - Stages of NASA Data:
    - Pre-storm assessment (feed weather prediction and forecasting models)

        - Near-real-time assessment (identify potential impacts ahead of landfall)
        - Post-storm assessment (help identify needs for support after landfall)
        - Data access and visualization
    - The NASA Disasters Mapping Portal takes disaster-related data and puts it into understandable, usable formats real-time use and application with the goal to bridge the gap between science products and the people who can use the data to assist in preparedness, response, mitigation, and recovery.
        - After a hurricane makes landfall, NASA satellites are in prime position to identify impacts such as damage, flood depth and extent, power outages, rainfall accumulation, landslide risk, and even soil moisture.
        - That information helps local governments, the Army Corps of Engineers, and FEMA monitor infrastructure failures and disruptions, isolate contaminated water supplies, and identify hotspots for urgent response needs.
- NASA also does plenty of its own deep research on hurricanes and tropical cyclone dynamics. A few examples among many:
    - NASA's Global Modeling and Assimilation Office is pioneering the use of ultra-high-resolution global weather and micro-climate models.
    - The CPEX-AW airborne campaign planned in the Caribbean this August and September will pilot new technology to use LiDAR to better understand atmospheric winds and convective clouds in tropical storms.
    - NASA's Jet Propulsion Laboratory (JPL) is studying the use of artificial intelligence/machine learning to improve hurricane prediction capabilities using NASA satellite data.

Search for Life, Technosignatures, and UAP/UFOs
Public and media interest in the topic of Unidentified Aerial Phenomenon/Unidentified Flying Objects (UAP/UFOs) has seen an uptick in recent weeks following reports about the Department of Defense's release of three unclassified Navy videos. Likewise, the 2021 Intelligence Authorization Act, signed in December 2020, stipulated the government had 180 days to gather and analyze data from disparate agencies. Below is our response to the public and media who call for NASA comment:

- One of NASA's key goals is the search for life in the universe. To date, NASA has yet to find any credible evidence of extraterrestrial life, however, NASA is exploring the solar system and beyond to help us answer fundamental questions, including whether we are alone in the universe. We stand ready to support the rest of the government in the search for life in the universe, be it close to home, on the planets or moons of our solar system, or deeper into space.

NASA Administrator Fighting for Funding for NASA Missions
On May 19, NASA Administrator Sen. Bill Nelson testified virtually about NASA's fiscal year 2022 budget in front of the House Committee on Science, Space, and Technology. Sen. Nelson emphasized the support necessary to continue pursuing NASA's goals and missions. On May 21, he sent a video and following message to NASA employees:

- President Biden's discretionary funding request for NASA – $24.8 billion – clearly demonstrates the Biden-Harris Administration's commitment to NASA, especially in light of the difficult circumstances of the past year. The full details of the president's budget

request are expected next week and will provide further insight into funding for all NASA programs.

Of course, NASA's goals and missions are challenging and require robust funding to see them through to completion. That's why I asked Congress yesterday, in a hearing before the House Appropriations Commerce, Justice, and Science Subcommittee, to include NASA in the upcoming American Jobs Plan, in addition to the president's full budget request.

NASA missions support tens of thousands of jobs nationwide and the Jobs Plan's focus on infrastructure, research, and development is an opportunity for Congress to include funding for NASA's critical missions, including the Artemis program, while also supporting good-paying American jobs.

China's Zhurong Mars rover landing last week is an example of why NASA's inclusion in the Jobs Bill is important – there is no time to wait.

Investments in technologies like nuclear thermal propulsion, advanced spacesuits, and updated, green infrastructure at our centers are important to our nation and NASA's future as a leader in space, innovation, and jobs around the country. I'm fighting to ensure the agency has the resources we need to continue that incredible legacy.

China Mars Lander

On May 14 (Eastern Time), China's Tianwen-1 orbiter deployed its rover, recently named "Zhurong," to the surface of Mars. NASA has been asked to comment on several aspects of the landing. On May 19, NASA Administrator Sen. Bill Nelson issued the following statement after the China National Space Administration's (CNSA's) release of the first photos from the Zhurong Mars rover:

- "Congratulations to the China National Space Administration on receiving the first images from the Zhurong Mars rover!" Nelson said. "As the international scientific community of robotic explorers on Mars grows, the United States and the world look forward to the discoveries Zhurong will make to advance humanity's knowledge of the Red Planet. I look forward to future international discoveries, which will help inform and develop the capabilities needed to land human boots on Mars."

  CNSA's successful landing of the Zhurong rover last week makes it only the second nation to ever land successfully on Mars. Zhurong joins active NASA missions – the Curiosity and Perseverance rovers and Insight Lander – in exploring the surface of the Red Planet.
- The week of May 16, media outlets asked whether CNSA used NASA animation from a Mars mission a decade ago for animation related to its Zhurong Mars lander. The following is our response:
  - NASA's imagery is made freely available for use by the public.
  - If pressed for more:
    - For questions about the Zhurong animation, please check directly with the China National Space Administration.

- NASA also was asked the week of May 16 whether the agency's InSight Mars lander was able to detect Zhurong's landing. The following is our response:
    - As part of its normal science, InSight's data acquired seismic and atmospheric measurements at the time of Zhurong's landing. As we did with NASA's Perseverance landing, the InSight science team examined seismic and pressure oscillation signals associated with the Zhurong landing. Based on preliminary examination of the data, we don't appear to have detected it, just as we didn't with Perseverance.
- Below is NASA's initial public comment about the landing from Science Mission Directorate Associate Administrator Dr. Thomas Zurbuchen on Twitter:
    - "Congratulations to CNSA's #Tianwen1 team for the successful landing of China's first Mars exploration rover, #Zhurong! Together with the global science community, I look forward to the important contributions this mission will make to humanity's understanding of the Red Planet."

Human Landing System Sen. Cantwell Amendment
On May 12, Sen. Maria Cantwell offered an amendment in committee markup of the Endless Frontier Act that included language and proposed funding related to NASA's Human Landing System for the Artemis program. Below is our response to the public and media who call for comment:

- NASA is excited to return to the Moon with more robot and human explorers than ever before as part of the Artemis program. Both government and commercial capabilities are necessary to enable long-term exploration on and around the Moon. By purchasing commercial services to take astronauts from lunar orbit to land on the surface of the Moon, we will ensure a robust deep space transportation system is in place as we learn to live and work on another world for the benefit of all. NASA is unable to comment on the proposed amendment due to ongoing litigation of the recent human landing system selection.

  More information can be found here: https://www.nasa.gov/nextstep/humanlander2

Webb Telescope Reported Possible Launch Delay
On May 12, Space News reported ongoing work to address a problem seen on two previous Ariane 5 rocket launches could delay the high-profile launch of NASA's James Webb Space Telescope. Below is our response to calls for comment:

- The launch readiness date for NASA's James Webb Space Telescope, which will be the premier observatory of the next decade, is Oct. 31, 2021. Webb is on schedule for that date, but we know schedule margin is tight. We are working closely with ESA and Arianespace on their launch vehicle readiness, and should a launch date change be needed, Webb has launch windows available almost every day of the year. Webb will study every phase in the history of our universe, including the first luminous glows after the creation of the cosmos, the formation of solar systems capable of supporting life on planets like Earth, and the evolution of our own solar system.

Roscosmos Spaceflight Participants to the International Space Station Announcements
On May 13, Roscosmos announced it plans to send spaceflight participants (non professional astronauts) for short trips to the International Space Station this year, including an actress and

filmmaker on a Soyuz flight in October. Below is the response to the public and media who ask for NASA comment:

- This year is truly a renaissance for human spaceflight both as we fly NASA and international partner astronauts on U.S. commercial crew spacecraft to the International Space Station and also as we see the expansion of private astronaut missions. As more people fly to space and do more things during their spaceflights, it attracts even more people to do more activities in low-Earth orbit, and reflects the growing market we envisioned the Commercial Crew Program enabling when we embarked on it about 10 years ago.

Webb Name Webb Telescope Name Statement

On May 7, Slate.com posted an article with the headline and sub-headline "The James Webb Space Telescope Hasn't Launched Yet. In One Way, It's Already a Relic. It will collect important data, but what does its name say about who it's for?" Below is our response to the public and media who call for comment:

- NASA is aware of concerns that have arisen about James E. Webb, and we are working with historians to examine his role in government. NASA named its next generation observatory, the James Webb Space Telescope, after its second administrator, who helped establish the Apollo Program that landed humans on the Moon. The agency made the naming decision in recognition of Webb's role in retaining an active science program at NASA in the agency's early years. Webb's work as administrator laid the groundwork for today's accomplishments, and science remains a critical part of NASA's work: to understand the universe, advance exploration, and inspire the next generation.

NASA's Ingenuity Mars Helicopter

On April 19, NASA's Ingenuity Mars Helicopter successfully completed the first attempt at powered, controlled flight of an aircraft on another planet. The experimental rotorcraft was carried to the Red Planet on NASA's Perseverance Mars rover. Ingenuity progressively added more complex flights on April 22, April 25, April 30, May 7, and May 23. On April 30, NASA announced that after its next two demonstration flights, Ingenuity will embark on a new operations demonstration phase, exploring how aerial scouting and other functions could benefit future exploration of Mars and other worlds.

- Ingenuity Key points:
  - Ingenuity is the first aircraft to attempt and achieve controlled flight on another planet (a "Wright Brothers" moment).
  - Ingenuity had already demonstrated feats of engineering – shrinking its size and mass, working with specialized materials, demonstrating flight in a thin atmosphere while still on Earth.
  - Tests on Earth proved many of its engineering principles.
  - With Ingenuity's success, future Mars exploration could include an ambitious aerial dimension.
  - Ingenuity is a technology demonstration. Its experimental mission is separate from the rover, but we do tech demos because they advance our capabilities and help prove concepts for future mission.
- Ingenuity's technology demonstration objectives are:
  - Prove powered flight in the thin atmosphere of Mars.

        - The Red Planet has lower gravity (about one-third that of Earth) but its atmosphere is just 1% as thick, making it much harder to generate lift.
    - Demonstrate miniaturized flying technology.
        - That requires shrinking down onboard computers, electronics and other parts so that the helicopter is light enough to take off.
    - Operate autonomously.
        - Ingenuity will use solar power to charge its batteries and rely on internal heaters to maintain operational temperatures during the cold Martian nights. After receiving commands from Earth relayed through the rover, each test flight is performed without real-time input from Mars Helicopter mission controllers.
- NASA's Perseverance Mars rover mission objectives are:
    - Take samples to leave on the surface for return to Earth in a few years. First leg of a round trip to Mars.
    - Search for signs of ancient microbial life as the rover explores a crater that billions of years ago might have been a large body of water like a lake.
    - Characterize the geology and climate of Mars.
    - Help pave the way for human exploration beyond the Moon.
- Perseverance Mars rover Key Points:
    - The Perseverance rover is the most capable rover ever sent to Mars and builds on the legacy of NASA's Mars Exploration Program and earlier rovers.
    - The mission embodies our nation's spirit of persevering even in the most challenging of situations, providing inspiration and advancing science and exploration. The mission itself personifies the human ideal of persevering toward the future.
    - The Mars 2020 mission is part of America's larger Moon to Mars exploration approach, which includes astronaut missions to the Moon that prepare for human exploration of the Red Planet.
    - NASA is committed to working with our international partners to accomplish stunning achievements in science, technology and exploration, and this mission reinforces those strong bonds.
    - Perseverance is the beginning of the first round-trip to another planet. The rover will collect rock and soil samples for return to Earth by future missions that could possibly confirm the ultimate astrobiology question: does life exist, or did it, elsewhere?
    - Perseverance carries the most sophisticated suite of instruments ever sent to Mars.
    - The mission addresses high-priority science goals to:
        - Return samples from Mars.
        - Search for clues about the potential for past life on Mars.
        - Find out what Mars' environment was like billions of years ago, and what might be preserved in the unique rocks of Jezero Crater.
        - Study what the planet's environment is like today.
    - NASA's robotic exploration of Mars is paving the way for future human missions to the Red Planet and will gather knowledge and demonstrate technologies that address the challenges of those human expeditions. Some relevant technologies include:
        - Entry, descent and landing technology.

        - In situ resource use.
        - Terrain-relative navigation.
    - The public will get to ride along. The mission has more cameras than any previous interplanetary mission, and while we have "felt" vibrations in response to wind with the InSight lander's seismometer and "translated" them into sounds that we could hear with the human ear, two microphones on Perseverance will attempt for the first time to hear audio of the rover's operations and travels, as well as the environment at Mars.
    - Perseverance joins a fleet that right now includes a rover, a lander and multiple orbiters. This is the 9th U.S. mission to land and the 5th rover. The U.S. is the only nation to successfully land on Mars.
    - On April 20, a toaster-size experimental instrument aboard Perseverance called the Mars Oxygen In-Situ Resource Utilization Experiment (MOXIE) converted some of the Red Planet's thin, carbon dioxide-rich atmosphere into oxygen – the first time this has ever been done.
        - While the technology demonstration is just getting started, it could pave the way for science fiction to become science fact – isolating and storing oxygen on Mars to help power rockets that could lift astronauts off the planet's surface. Such devices also might one day provide breathable air for astronauts themselves.

UPCOMING EVENTS PUBLIC DATES

Below are the publicly listed dates of some high-profile activities/events/milestones in 2021. Internal planning, target, and pre-decisional dates are not listed below as they're not official and public yet. The public dates listed are as specific as they can be, at this time. This list will be regularly updated and added to, as appropriate. Text in red is newly updated public information:

- **State of NASA – June 2**: NASA Administrator Bill Nelson's first live address to the NASA workforce about the state of the agency and its activities
- **Russian Spacewalk on the International Space Station - June 2:** Russian EVA 48 (Novitskiy and Dubrov) from Poisk to dismantle cables for Pirs docking compartment undocking
- **SpaceX CRS-22 – June 3:** Next commercial resupply services mission to space station from Florida
- **Laser Comm – June 23:** NASA's Laser Communications Relay Demonstration to test optical communications launches from Florida
- **Boeing Orbital Flight Test-2 – July 30 –** Boeing's uncrewed CST-100 Starliner OFT-2 (Orbital Flight Test-2) launch from Florida to the International Space Station
- **Northrop Grumman CRS-16 – July 2021:** Commercial resupply services mission to space station from Virginia
- **X-57 – Fall 2021 --** Flight test for NASA's first all-electric plane, X-57, at Armstrong Flight Research Center
- **Landsat 9 – September:** NASA and U.S. Geological Survey launch latest Earth observation satellite, Landsat 9, from California
- **CAPSTONE – Fall 2021:** NASA CubeSat to validate new navigation technologies and verify dynamics in Gateway's planned orbit will launch to space
- **Imaging X-Ray Polarimetry Explorer – Fall 2021:** NASA's IXPE mission to discover hidden astronomical objects in the universe launches from Florida

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- **SpaceX CRS-23 – Fall 2021:** Commercial resupply services mission to space station from Florida
- **Lucy – Oct 16:** NASA's Lucy mission to study the Trojan asteroids of Jupiter will launch from Florida
- **SpaceX Crew-3 – No earlier than Oct. 23:** Crew-3 will launch to station from Florida
- **SpaceX Crew-2 Return – No Earlier than Oct. 31:** Crew-2 returns to Earth
- **Webb Telescope – (Launch Readiness Date) Oct. 31:** NASA's James Webb Space Telescope to help answer questions about our cosmic origins launches from French Guiana
- **DART – Nov. 24:** Window opens to launch Double Asteroid Redirection Test from California, NASA's first flight demonstration for planetary defense
- **Webb Telescope – November/December:** The James Webb Space Telescope completes mission deployments/arrives in its L2 (second Lagrange Point) orbit about 29 days after launch
- **Artemis I - November:** NASA reviewing launch date for first integrated flight test of the uncrewed Space Launch System rocket and Orion spacecraft launches on a multi-week mission around the Moon
- **Orion splashdown:** NASA's Orion spacecraft splashes down on Earth following a multi-week mission around the Moon
- **Geostationary Operational Environmental Satellite-T – December:** NASA and NOAA's latest weather satellite, GOES-T, launches from Florida
- **Astrobotic's CLPS Flight – Late 2021:** Suite of robotic NASA payloads sent to the lunar surface as part of a Commercial Lunar Payload Services delivery. Landing takes place in the following weeks
- **Boeing's Crew Flight Test – Under review pending OFT-2:** Boeing's CFT earliest possible launch to space station from Florida
- **Boeing Starliner-1 – Under review pending outcome of earlier flight tests:** Launch date for first operational Boeing commercial crew launch to space station from Florida
- **Astronaut Candidates – 2021**: NASA will announce selections for the next class of astronaut candidates to begin training
- **Intuitive Machines' CLPS Flight – Early 2022:** Suite of robotic NASA payloads sent lunar surface as part of a Commercial Lunar Payload Services delivery. Landing takes place in the following weeks

AGENCY COMMUNICATION THEME PRIORITIES

For full key points and other products for all themes, visit: https://communications.nasa.gov.

Earth

NASA uses the vantage point of space to understand and explore our home planet, improve lives and safeguard our future.
Tagline: **Your Home. Our Mission.**

Flight

NASA explores new technologies to make aircraft quieter and faster, get you gate-to-gate safely and on time, and transform aviation into a new economic engine at all altitudes.
Tagline: **NASA is With You When You Fly.**

Humans in Space

NASA leads human space exploration in low-Earth orbit with commercial and international

partners to enable missions to the Moon and Mars. International Space Station missions are a catalyst for economic development and the advancement of scientific knowledge and new technologies that improve our lives.
Tagline: **Leading Discovery, Improving Life on Earth.**

Moon to Mars
NASA is leading a sustainable return to the Moon with commercial and international partners to expand human presence in space and bring back new knowledge and opportunities.
Tagline: Moon Lights the Way.

Solar System & Beyond
NASA is exploring our Solar System and beyond, uncovering worlds, stars, and cosmic mysteries near and far with our powerful fleet of space and ground-based missions.
Tagline: **Discovering the Secrets of the Universe.**

Space Tech
NASA technologies advance capabilities for space exploration, promote America's global leadership in innovation and transform the world around us.
Tagline: **Technology Drives Exploration.**

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NASA INTERVIEW PREP DOCUMENT

RECENT HOT TOPICS

Quick Reference

Upcoming Events
Public Dates

Search for Life, Technosignatures, and UAP/UFOs

Public and media interest in the topic of UAP/UFO (Unidentified Aerial Phenomena /Unidentified Flying Objects) has seen an uptick in recent weeks following reports related to the Department of Defense's release of three unclassified U.S. Navy videos. An unclassified preliminary report from the Office of the Director of National Intelligence was released June 25, which is when we posted a NASA article on what the agency is doing to search for life beyond Earth. And below is our response to the public and media who call for NASA comment:

- One of NASA's key goals is the search for life in the universe. To date, NASA has yet to find any credible evidence of extraterrestrial life; however, NASA is exploring the solar system and beyond to help us answer fundamental questions, including whether we are alone in the universe. We lead the U.S. government's search for extraterrestrial life, be it close to home, on the planets or moons of our solar system, or deeper into space.

  NASA does not actively search for UAPs and the lack of robust data is the central problem for scientific study of UAPs and to determine whether they are natural or human-made phenomena – there is no current data to support that UAPs or UFOs are evidence of alien technologies.

Hubble Space Telescope Issue

Starting on June 16, NASA has provided status updates that the Hubble Space Telescope operations team has been working since June 13 to resolve an issue with the observatory's payload computer.

- The Hubble operations team continues working to solve the payload computer issue onboard the Hubble Space Telescope. The team is working to collect all the data available to them to isolate the problem and determine the best path forward for bringing the computer back to operations. At this time, there is no definitive timeline for bringing the computer back online. However, the team has multiple options available to them and are working to find the best solution to return the telescope to science operations as soon as possible. Launched in 1990, Hubble has contributed greatly to our understanding of the universe over the past 30 years.

Senate Confirms Pam Melroy as NASA's Deputy Administrator

On June 17, the U.S. Senate confirmed Pam Melroy to be NASA's next Deputy Administrator. The following statements were issued following confirmation:

- "It's an honor to be confirmed by the Senate to serve as NASA Deputy Administrator, and I am humbled by President Biden and Vice President Harris' confidence in me," Melroy said. "I look forward to returning to the NASA family and working with Administrator Nelson to ensure the United States continues to lead in space and beyond – exploring the wonders of the universe, expanding the Earth science research critical to combatting climate change, unlocking scientific discoveries that will change the world as we know it, and inspiring the next generation of discoverers and dreamers."

- "Pam is a pioneer and veteran of NASA, and will be an outstanding leader as we venture farther out to the stars," said NASA Administrator Bill Nelson. "We certainly are lucky to have her on board, and I look forward to leading NASA with her as a team."

Mission Equity

On June 15, NASA announced a new effort called Mission Equity that included issuing a Request for Information (RFI) seeking public input to broaden access to the agency.

- NASA is launching Mission Equity, a comprehensive effort to assess expansion and modification of agency programs, procurements, grants, and policies, and examine what potential barriers and challenges exist for communities that are historically underrepresented and underserved.
- NASA Administrator Bill Nelson said of Mission Equity:
  - "NASA is a 21st century agency with 22nd century goals. To be successful, it's critical that NASA takes a comprehensive approach to address the challenges to equity we see today. The agency's new Mission Equity is a bold and necessary challenge for NASA to ensure our programs are accessible to all Americans and, especially, those living in historically underserved communities across the country. Because when NASA opens doors to talent previously left untapped, the universe is the limit."
- NASA issued a request for information (RFI) on June 15, entitled Advancing Racial Equity and Support for Underserved Communities in NASA Programs, Contracts and Grants. To this RFI, the agency is seeking public feedback as it conducts a thorough review of its programs, practices, and policies to assess:
  - Potential barriers that underserved and underrepresented communities and individuals may face in agency procurement, contract, and grant opportunities.
  - Whether new policies, regulations, or guidance may be necessary to advance equity and opportunities in agency actions and programs.
  - How agency resources and tools can assist in enhancing equity, including advancing environmental justice.
- Areas in which the agency would like to receive comments include:
  - Diversity and Equal Opportunity at NASA and in the STEM Community
  - Opportunities for NASA to Leverage its Data, Expertise, and Missions to Help Underserved Communities
  - Barriers/Gaps to Accessing Current NASA Grants, Programs, and Procurements
  - Engagement and Outreach with Organizations and Individuals from Underserved and Underrepresented Communities
- Underserved and underrepresented communities include: Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality.
- Through the RFI process, NASA hopes to initiate vibrant, meaningful, and ongoing dialogues that will help the agency build and improve current agency policies, practices, and programs. The deadline for public comments to this RFI is Monday, July 12, but we encourage submission of comments as soon as possible to enable early analysis and follow-up discussions. NASA will host a virtual public meeting soon, during which NASA officials will discuss the RFI and corresponding agency goals.

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NASA Administrator Statement on US Innovation and Competitiveness Act
NASA Administrator Bill Nelson released the following statement June 8 after the Senate passed the U.S. Innovation and Competitiveness Act:

- "The U.S. Innovation and Competitiveness Act, which includes the NASA authorization bill, is an investment in scientific research and technological innovation that will help ensure the U.S. continues to lead in space and sets us on a path to execute many landings on the Moon in this decade. I applaud the Senate passage of the bill and look forward to working with the House to see it passed into law."

NASA Selects Two Missions to Venus
On June 2, NASA announced it has selected two new missions to Venus.

- NASA's two new missions to Earth's nearest planetary neighbor aim to understand how Venus became an inferno-like world when it has so many other characteristics similar to ours – and may have been the first habitable world in the solar system, complete with an ocean and Earth-like climate.
- The selected missions are:
    - DAVINCI+ (Deep Atmosphere Venus Investigation of Noble gases, Chemistry, and Imaging)
        - DAVINCI+ will measure the composition of Venus's atmosphere to understand how it formed and evolved, as well as determine whether the planet ever had an ocean.
        - The mission consists of a descent sphere that will plunge through the thick atmosphere, making precise measurements of noble gases and other elements to understand why Venus's atmosphere is a runaway hothouse compared the Earth's.
        - DAVINCI+ also will return the first high resolution pictures of the unique geological features on Venus known as "tesserae," which may be comparable to Earth's continents, suggesting that Venus has plate tectonics.
        - This would be the first U.S.-led, missions to Venus's atmosphere since 1978, and the results from DAVINCI+ could reshape our understanding of terrestrial planet formation in our solar system and beyond.
    - VERITAS (Venus Emissivity, Radio Science, InSAR, Topography, and Spectroscopy)
        - VERITAS will map Venus' surface to determine the planet's geologic history and understand why it developed so differently than Earth.
        - Orbiting Venus with a synthetic aperture radar, VERITAS will chart surface elevations over nearly the entire planet to create 3D reconstructions of topography and confirm whether processes such as plate tectonics and volcanism are still active on Venus.
        - VERITAS also will map infrared emissions from Venus' surface to map its rock-type, which is largely unknown, and determine whether active volcanoes are releasing water vapor into the atmosphere.
- In addition to the two missions, NASA selected a pair of technology demonstrations to fly along with them.

  - VERITAS will host the Deep Space Atomic Clock-2, built by NASA's Jet Propulsion Laboratory and funded by NASA's Space Technology Mission Directorate. The ultra-precise clock signal generated with this technology will ultimately help enable autonomous spacecraft maneuvers and enhance radio science observations.
  - DAVINCI+ will host the Compact Ultraviolet to Visible Imaging Spectrometer (CUVIS) built by NASA's Goddard Space Flight Center. CUVIS will make high resolution measurements of ultraviolet light using a new instrument based on freeform optics. These observations will be used to determine the nature of the unknown ultraviolet absorber in Venus's atmosphere that absorbs up to half the incoming solar energy.
- DAVINCI+ and VERITAS are the final selections from four mission concepts NASA's Discovery Program picked in February 2020 as part of the agency's Discovery 2019 competition. Following a competitive, peer-review process, the two missions were chosen based on their potential scientific value and the feasibility of their development plans.
- NASA is awarding approximately $500 million per mission for development. Each is expected to launch between 2028 - 2030. The project teams now will work to finalize their requirements, designs, and development plans.

Webb Telescope Reported Possible Launch Delay
During a June 1 ESA (European Space Agency) news conference, media asked about reported possible launch delays to NASA's James Webb Space Telescope. Below is our response to calls for comment:

- NASA's James Webb Space Telescope, which will be the premier observatory of the next decade, remains on schedule for a launch readiness date no earlier than Oct. 31, 2021.

  Webb will ship to the launch site in August with little to no schedule margin. Launch processing will take two months. The observatory has completed all the post-environmental testing deployments, and it's in its final integration and folding stages. Final stow, closeout, and pack and ship are imminent. We are working closely with ESA and Arianespace on establishing the launch date. We'll launch approximately four months after the first launch of the Ariane 5 this year, which is scheduled for late July. Webb has no launch date constraints, so it can launch almost any day of the year.

  Webb will study every phase in the history of our universe, including the first luminous glows after the creation of the cosmos, the formation of solar systems capable of supporting life on planets like Earth, and the evolution of our own solar system.

Fiscal Year 2022 NASA Full Budget Proposal
On May 28, the Biden-Harris Administration released the full budget proposal for Fiscal Year 2022.

- President's Fiscal Year 2022 budget requests $24.8 billion for NASA, an increase of more than 6% over what the agency received the previous year.

Overarching Points

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- This funding request demonstrates the president's commitment to NASA and the people across the agency and its partners who have worked so hard this past year under the most difficult circumstances and achieved unprecedented success.
- The NASA workforce and the American people should be encouraged by what they see in this budget request. It is an investment in our future, and it shows confidence in what this agency has to offer. We owe it to the president and the American people to be good and responsible stewards of every tax dollar invested in NASA.
- This budget request includes the strongest NASA budget ever for science, which will help address the climate crisis at home and abroad, as well as advance robotic missions that will pave the way for astronauts to explore the Moon and Mars.
- This is also the strongest budget for exploration since the Apollo program.
- This budget request will restore America's global standing, promote racial and economic equity, and drive economic growth.

<u>Supports Human Exploration of the Moon, Mars, and Beyond</u>

- The president's funding request increases funding for Artemis by $350 million and gives us the resources to advance America's bipartisan Moon to Mars space exploration plan, agreed to by the Administration and Congress.
- This request keeps us on the path toward a regular cadence of Artemis missions with crew to the Moon by the middle of the decade.
- NASA's human landing system contract award, with the goal of a human demonstration mission to the lunar surface by 2024, is under protest.
- NASA is currently reviewing the overall Artemis timeline based on appropriations and expected budget, and outcome of the human landing system protest. We hope to provide an updated Artemis timeline later this year following conclusion of the protest.
- The FY2022 budget request assumes an Artemis I launch no earlier than November 2021, an Artemis II launch no earlier than September 2023, followed by Artemis III targeted for late 2024 and Artemis IV for late 2025. Landing the first woman and first person of color on the lunar surface as part of the Artemis program will promote equity – signaling to every American they too can see themselves among the stars.
- With NASA's Space Launch System rocket and Orion spacecraft, as well as U.S. commercial partnerships with the human landing system and Gateway lunar outpost, we will send astronauts to the Moon to test technologies and exploration practices that will make future missions more productive than ever before.
- This budget funds an upgraded Space Launch System, known as Block1B, that can deliver larger cargos to lunar orbit.
- Gateway, built with our commercial and international partners, is important to sustainable lunar operations.
    - The foundation of our lunar outpost is targeted to launch no earlier than November 2024, with additional modules from our international partners launching later.
- We are working day and night to reduce risks and overcome the challenges of long-term human exploration of the Moon and Mars.
- The budget funds early design work and planning for additional surface architecture necessary including the lunar terrain vehicle and surface habitats to ensure our astronauts can explore more of the Moon than ever before and stay for increasingly longer periods of time in deep space.

- NASA's Lunar Surface Innovation Initiative is advancing technologies to support mission operations on the Moon. This budget includes funding for the preliminary design of a fission surface power system that could power operations on the Moon and Mars.

Furthers Robotic Exploration of the Solar System and the Universe

- This funding request also furthers robotic exploration of the solar system and the universe.
- The budget provides more than $650 million for the Mars Sample Return mission, the highest priority large mission in planetary science.
- It includes strong support for planetary defense, including the near-Earth objects (NEO) Surveyor mission to detect asteroids and comets that could potentially impact Earth.

Enhances Research and Development at NASA

- This funding request supports continued progress developing cutting-edge space technologies, transformative capabilities, and renewable energy, all of which feed the economy and create good paying American jobs.
- Investing in new technologies enhances NASA's missions and fosters the growing space economy.
- NASA routinely demonstrates new technologies, reducing overall risk and encouraging industry adoption. The budget includes $500 million for technology demonstrations.
- It fully funds the On-orbit Servicing, Assembly, and Manufacturing 1 (OSAM-1) mission. Robotically refueling a satellite and manufacturing and assembling spacecraft parts in-orbit will foster a more sustainable space economy.
- Launching next month, our Laser Communications Relay Demonstration will demonstrate a technology that can provide 10-100 times better data rates than commonly used radio frequency communications systems. In the coming years, we'll further refine laser communications technology for use in deep space.
- More than $280 million would be directed toward small business innovation research and technology transfer. The increase of $60 million will provide more money to small companies to research new ideas and develop innovative solutions to challenging problems.
- An investment in NASA and space infrastructure reaffirms our nation is the world's premier partner in space collaboration, and we will be for decades to come.
- We are investing in aviation to make our skies safer, our fuels cleaner, and to get you to your destination faster than ever before. This also includes investing in next-generation aeronautics research that will safely integrate automated aircraft systems with piloted airplanes.
    - This budget enhances American competitiveness in the global aviation industry including the first two flights of new X-57 and X-59 aircraft.
    - NASA aeronautics is leading transformation of the way people and goods are moved through Advanced Air Mobility (air taxis, drone cargo deliveries, etc.), an emerging market expected to be worth $115 billion a year by 2035.
        - It will help safely deliver revolutionary aviation capabilities to previously underserved local, regional, intraregional, and urban areas. NASA investments today will spur the advancements of tomorrow.
- The budget provides a $30 million increase to accelerate transformative science at the frontiers of biological and physical sciences research in space.

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Advances Climate Science

- Climate change has increasing economic and national security impacts, and this budget increases investments in climate research and science programs.
- This funding increases our ability to better understand Earth and how it works as an integrated system, from our oceans to our atmosphere and how it all impacts our daily lives.
- NASA is developing the next-generation Earth System Observatory. NASA's new Earth System Observatory will provide the world with an unprecedented understanding of our Earth's climate system, arming us with next-generation data critical to mitigating climate change, and protecting our communities in the face of natural hazards.
    - The Earth System Observatory will help improve our understanding of extreme weather events and our decision making on climate resilience, adaptation, and mitigation. It will also inform decisions that ensure communities have the resources they need to build resilience prior to these crises.
- Research on zero-emissions aviation
    - NASA Aeronautics is partnering with industry, academia and other agencies through the Sustainable Flight National Partnership to accomplish the aviation community's aggressive climate change agenda. Through advanced vehicle technologies, efficient airline operations and sustainable aviation fuels, collectively NASA and our federal government and industry partners aim to reduce carbon emissions from aviation by half by 2050, compared to 2005, and achieve net-zero emissions by 2060.
- NASA continues to lead the development of new small spacecraft capabilities. For example, small platforms can enable distributed observations for climate science.

Builds a Diverse Future STEM Workforce

- This budget invests in the Artemis Generation. It requests funding for NASA's STEM engagement efforts for the first time in five years to inspire the next generation of scientists, engineers, mathematicians, and explorers by supporting the agency's STEM efforts.
- With this budget, NASA will increase funding for Space Grant and MUREP and will work with university and consortia partners to implement initiatives focused on diversity, equity and inclusion.
- NASA taps into the skills of a diverse group of partners and reaches new groups through our small business programs, academic partnerships, and prizes, challenges, and crowdsourcing activities.
- The Space Technology Mission Directorate is collaborating with OSTEM's Minority University Research and Education Project to offer research planning grants and incentivize partnerships between minority-serving institutions and small businesses, setting them up to apply to NASA opportunities.

Continues Research on the International Space Station

- The space station is a convergence of science, technology, and human innovation that demonstrates new technologies and enables research not possible on Earth. The space station remains the springboard to NASA's next great leap in exploration, including future human missions to the Moon and eventually to Mars.

- With continued support for the International Space Station and the Artemis program, the president welcomes the international community to join us as we push human exploration deeper into space.
- This budget supports early design maturation of multiple commercially owned and operated low-Earth orbit (LEO) destinations (free flyers) from which NASA, along with other customers, can purchase services and stimulate the growth of commercial activities in LEO.
- In addition to maintaining continuous U.S. access to a space station in LEO, these new and more cost-effective platforms will democratize access to space by lowering the barriers to entry for the next generation of researchers, technologists, and tourists.

Hurricanes and NASA

June 1 is the official start of hurricane season for the Atlantic Ocean.

- After 2020 brought a record number of named storms in 2020, NASA is once again prepared to help understand and monitor these storms from its unique vantage point of space.
- NASA develops and launches satellites for NOAA, which is the lead federal agency for forecasting hurricanes. But the science of hurricanes doesn't start – or end – with forecasting.
- Global warming is increasing the heat in the ocean basins and already making it more likely that storms will intensify faster and be stronger, a phenomenon NASA scientists continue to study deeply.
- With the challenge posed by climate change, NASA has never been more committed to innovation in Earth science research.
    - Our next-generation Earth System Observatory, announced on May 24, missions will help us understand extreme weather events and other climate-fueled hazards to inform the solutions of the future.
- NASA researchers and data also support U.S. stakeholders before, during and after storms make landfall.
    - Stages of NASA Data:
        - Pre-storm assessment (feed weather prediction and forecasting models)
        - Near-real-time assessment (identify potential impacts ahead of landfall)
        - Post-storm assessment (help identify needs for support after landfall)
        - Data access and visualization
- The NASA Disasters Mapping Portal takes disaster-related data and puts it into understandable, usable formats real-time use and application with the goal to bridge the gap between science products and the people who can use the data to assist in preparedness, response, mitigation, and recovery.
    - After a hurricane makes landfall, NASA satellites are in prime position to identify impacts such as damage, flood depth and extent, power outages, rainfall accumulation, landslide risk, and even soil moisture.
    - That information helps local governments, the Army Corps of Engineers, and FEMA monitor infrastructure failures and disruptions, isolate contaminated water supplies, and identify hotspots for urgent response needs.
- NASA also does plenty of its own deep research on hurricanes and tropical cyclone dynamics. A few examples among many:

- NASA's Global Modeling and Assimilation Office is pioneering the use of ultra-high-resolution global weather and micro-climate models.
- The CPEX-AW airborne campaign planned in the Caribbean this August and September will pilot new technology to use LiDAR to better understand atmospheric winds and convective clouds in tropical storms.
- NASA's Jet Propulsion Laboratory (JPL) is studying the use of artificial intelligence/machine learning to improve hurricane prediction capabilities using NASA satellite data.

Webb Name Webb Telescope Name Statement
On May 7, Slate.com posted an article with the headline and sub-headline "The James Webb Space Telescope Hasn't Launched Yet. In One Way, It's Already a Relic. It will collect important data, but what does its name say about who it's for?" Below is our response to the public and media who call for comment:

- NASA is aware of concerns that have arisen about James E. Webb, and we are working with historians to examine his role in government. NASA named its next generation observatory, the James Webb Space Telescope, after its second administrator, who helped establish the Apollo Program that landed humans on the Moon. The agency made the naming decision in recognition of Webb's role in retaining an active science program at NASA in the agency's early years. Webb's work as administrator laid the groundwork for today's accomplishments, and science remains a critical part of NASA's work: to understand the universe, advance exploration, and inspire the next generation.

UPCOMING EVENTS PUBLIC DATES
Below are the publicly listed dates of some high-profile activities/events/milestones in 2021 and 2022. Internal planning, target, and pre-decisional dates are not listed below as they're not official and public yet. The public dates listed are as specific as they can be, at this time. This list will be regularly updated, as appropriate. Text in red is newly updated public information:

- **TROPICS Pathfinder Launch – No earlier than June 29:** Launch of a test satellite or Pathfinder on a rideshare on SpaceX Transporter 2 from Cape Canaveral Space Force Station, ahead of a constellation of six small satellites (launching in 2022) that will work together to provide near hourly updates of hurricanes and tropical cyclones
- **Boeing Orbital Flight Test-2 – July 30 –** Boeing's uncrewed CST-100 Starliner OFT-2 (Orbital Flight Test-2) launch from Florida to the International Space Station
- **Northrop Grumman CRS-16 – July 2021:** Commercial resupply services mission to space station from Virginia
- **Landsat 9 – September:** NASA and U.S. Geological Survey launch latest Earth observation satellite, Landsat 9, from California
- **Lucy – Oct 16:** NASA's Lucy mission to study the Trojan asteroids of Jupiter will launch from Florida
- **SpaceX Crew-3 – No Earlier than Oct. 31:** Crew-3 will launch to station from Florida
- **SpaceX Crew-2 Return – Early to mid-November:** Crew-2 returns to Earth
- **Webb Telescope – (Launch Readiness Date) Oct. 31:** NASA's James Webb Space Telescope to help answer questions about our cosmic origins launches from French Guiana
- **X-57 – (tentative Oct. 31) –** Flight test for NASA's first all-electric plane, X-57, at Armstrong Flight Research Center

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- **DART – Nov. 24:** Window opens to launch Double Asteroid Redirection Test from California, NASA's first flight demonstration for planetary defense
- **Webb Telescope – November/December:** The James Webb Space Telescope completes mission deployments/arrives in its L2 (second Lagrange Point) orbit about 29 days after launch
- **Artemis I - November:** NASA reviewing launch date for first integrated flight test of the uncrewed Space Launch System rocket and Orion spacecraft launches on a multi-week mission around the Moon
- **Orion splashdown – Late 2021:** NASA's Orion spacecraft splashes down on Earth following a multi-week mission around the Moon
- **Geostationary Operational Environmental Satellite-T – December:** NASA and NOAA's latest weather satellite, GOES-T, launches from Florida
- **SpaceX CRS-23 – Fall 2021:** Commercial resupply services mission to space station from Florida
- **CAPSTONE – Fall 2021:** NASA CubeSat to validate new navigation technologies and verify dynamics in Gateway's planned orbit will launch to space
- **Imaging X-Ray Polarimetry Explorer – Fall 2021:** NASA's IXPE mission to discover the secrets of black holes, pulsars, and other high-energy objects in the universe launches from Florida
- **Boeing's Crew Flight Test – Late 2021, under review pending OFT-2:** Boeing's CFT earliest possible launch to space station from Florida
- **Boeing Starliner-1 – Under review pending earlier flight tests:** Launch date for first operational Boeing commercial crew launch to space station from Florida
- **Astronaut Candidates – Late 2021**: NASA will announce selections for the next class of astronaut candidates to begin training
- **Laser Comm – Under Review:** NASA's Laser Communications Relay Demonstration to test optical communications launches from Florida
- **Intuitive Machines' CLPS Flight – Early 2022:** Suite of robotic NASA payloads sent lunar surface as part of a Commercial Lunar Payload Services delivery. Landing takes place in the following weeks
- **Astrobotic's CLPS Flight – 2022:** Suite of robotic NASA payloads sent to the lunar surface as part of a Commercial Lunar Payload Services delivery. Landing takes place in the following weeks.
- **Artemis II Crew Announcement – Early 2022:** NASA will announce the astronauts that will fly on the first crewed flight of Orion spacecraft and Space Launch System rocket for the Artemis II mission.
- **Webb Telescope – Spring 2022:** First science images from the James Webb Space Telescope, about six months after launch
- **TROPICS Launch – Spring 2022:** Time-Resolved Observations of Precipitation structure and storm Intensity with a Constellation of Smallsats (TROPICS), a constellation of six CubeSats, will launch from Kwajalein Atoll in the Marshall Islands. The satellites will work together to provide near hourly updates of hurricanes and tropical cyclones
- **The next crew rotation mission to the International Space Station after NASA's SpaceX Crew-3 is targeted for no earlier than mid-April 2022:** The specific commercial crew partner's spacecraft and rocket will be determined at a later date

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- **X-59 QueSST First Flight – (tentative June 1, 2022):** The first flight of the X-59 Quiet SuperSonic Technology (QueSST) aircraft will take place out of Lockheed flight facilities in Palmdale, California
- **Psyche – August 2022:** Window opens to launch Psyche from Florida, NASA's mission to study the metal-rich asteroid 16 Psyche.
- **Surface Water and Ocean Topography (SWOT) Launch – November 2022:** Launch of SWOT to observe details of the ocean's surface topography, and measure how water bodies change over time , jointly developed by NASA and the Centre National d'Études Spatiales (CNES), with contributions from the U.K. Space Agency (UKSA) and the Canadian Space Agency (CSA)
- **NISAR Launch (NASA + Indian Space Research Organization + synthetic aperture radars) – Late 2022:** Joint mission between NASA and the Indian Space Research Organization to track subtle changes in Earth's surface, spot warning signs of imminent volcanic eruptions, help to monitor groundwater supplies, track the melt rate of ice sheets tied to sea level rise, and observe shifts in the distribution of vegetation around the world
- **PACE Launch (Plankton, Aerosol, Cloud, ocean Ecosystem) - 2022:** PACE will advance the assessment of ocean health by measuring the distribution of phytoplankton, tiny plants and algae that sustain the marine food web
- **TEMPO launch (Tropospheric Emissions Monitoring of Pollution) - 2022:** NASA's first Earth Venture Instrument mission will measure pollution of North America, from Mexico City to the Canadian oil sands, and from the Atlantic to the Pacific hourly and at high spatial resolution. TEMPO will be the first space-based instrument to monitor air pollutants hourly across the North American continent during daytime

AGENCY COMMUNICATION THEME PRIORITIES
For full key points and other products for all themes, visit: https://communications.nasa.gov.

Earth
NASA uses the vantage point of space to understand and explore our home planet, improve lives and safeguard our future.
Tagline: **Your Home. Our Mission.**

Flight
NASA explores new technologies to make aircraft greener and quieter, get you gate-to-gate safely and on time, and transform aviation into a new economic engine at all altitudes.
Tagline: **NASA is With You When You Fly.**

Humans in Space
NASA leads human space exploration in low-Earth orbit with commercial and international partners to enable missions to the Moon and Mars. International Space Station missions are a catalyst for economic development and the advancement of scientific knowledge and new technologies that improve our lives.
Tagline: **Leading Discovery, Improving Life on Earth.**

Moon to Mars
NASA is leading a sustainable return to the Moon with commercial and international partners to expand human presence in space and bring back new knowledge and opportunities.
Tagline: Moon Lights the Way.

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Solar System & Beyond
NASA is exploring our Solar System and beyond, uncovering worlds, stars, and cosmic mysteries near and far with our powerful fleet of space and ground-based missions.
Tagline: **Discovering the Secrets of the Universe.**

Space Tech
NASA technologies advance capabilities for space exploration, promote America's global leadership in innovation and transform the world around us.
Tagline: **Technology Drives Exploration.**

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NASA INTERVIEW PREP DOCUMENT

RECENT HOT TOPICS

Quick Reference

Upcoming Events
Public Dates

NASA Statement on GAO Ruling for Human Landing System

The following is the NASA statement in response to the U.S. Government Accountability Office (GAO) decision released July 30 on the human landing system protest:

- "NASA was notified Friday, July 30, that the U.S. Government Accountability Office has denied the protests filed by Blue Origin Federation and Dynetics and has upheld the agency's source selection of SpaceX to continue the development of its human landing system. The decision enables NASA to award the contract that will ultimately result in the first crewed demonstration landing on the surface of the Moon under NASA's Artemis plan. Importantly, the GAO's decision will allow NASA and SpaceX to establish a timeline for the first crewed landing on the Moon in more than 50 years.

  "NASA recognizes that sending American astronauts back to the Moon for the first time since the Apollo program and establishing a long-term presence on the Moon is a priority for the Biden Administration and is imperative for maintaining American leadership in space. In the face of challenges during the last year, NASA and its partners have made significant achievements to advance Artemis, including a successful hot fire test for the Space Launch System rocket. An uncrewed flight of Artemis I is on track for this year and a crewed Artemis II mission is planned for 2023.

  "NASA is moving forward with urgency, but astronaut safety is the priority and the agency will not sacrifice the safety of the crew in the steadfast pursuit of the goal to establish a long-term presence on the Moon.

  "As soon as possible, NASA will provide an update on the way ahead for Artemis, the human landing system, and humanity's return to the Moon. We will continue to work with the Biden Administration and Congress to ensure funding for a robust and sustainable approach for the nation's return to the Moon in a collaborative effort with U.S. commercial partners."

Russia International Space Station Science Module Statement

Russia's uncrewed Multipurpose Laboratory Module (MLM), named Nauka, docked to the International Space Station on July 29. The update below follows what happened after docking and serves as NASA's comments:

- Following the docking of the Multipurpose Laboratory Module (MLM), named Nauka, to the International Space Station July 29, Russian cosmonauts aboard the space station conducted leak checks between Nauka and the service module. Several hours later, the flight control team noticed the unplanned firing of MLM thrusters that caused the station to move out of orientation. Ground teams regained attitude control and the motion of the space station is stable.

The crew was never and is not in any danger, and flight controllers in Mission Control Houston are monitoring the status of the space station as Russia's flight controllers continue to checkout the MLM.

Boeing Orbital Flight Test-2

NASA's Boeing Orbital Flight Test-2 (OFT-2) mission to the International Space Station now is targeted for launch at 1:20 p.m. EDT Tuesday, Aug. 3, on a United Launch Alliance (ULA) Atlas V rocket from Space Launch Complex-41 at Cape Canaveral Space Force Station in Florida. On July 29, NASA and Boeing decided to stand down from a scheduled July 30 launch attempt to allow the space station team time to continue working checkouts of the newly arrived Roscosmos' Nauka module and to ensure the station will be ready for Starliner's arrival. OFT-2 is the second uncrewed flight for Boeing's CST-100 Starliner spacecraft as part of the agency's Commercial Crew Program.

- NASA's Commercial Crew Program and our commercial industry partner, Boeing, are taking a major step on the path to regular human spaceflight launches to the International Space Station on American rockets and spacecraft from American soil.
- NASA's Boeing Orbital Flight Test-2 (OFT-2) will fly a full mission profile, testing end-to-end capabilities of the Starliner system from pre-launch to docking and undocking, to landing and recovery in the desert of the western United States. OFT-2 will provide valuable data toward NASA certifying Boeing's crew transportation system for carrying astronauts to and from the space station.
- OFT-2 is the second orbital flight for the CST-100 Starliner, and the first for the second crew module in the Starliner fleet. Boeing proactively announced it would fly a second orbital test on its own cost to prove the Starliner system meets NASA's requirements, including docking to the space station.
    - This flight test will build on the knowledge we gained during the first test (in December 2019), which didn't achieve all the planned objectives. This mission also will test the changes and improvements made to Starliner, and prove the system is ready to fly astronauts. Following a successful mission, we are targeting a launch late this year for NASA's Boeing Crew Flight Test - Starliner's first flight with astronauts aboard.
- For more than 20 years, humans have continuously lived and worked aboard the International Space Station, advancing scientific knowledge and demonstrating new technologies that enable us to prepare for human exploration to the Moon and Mars.
- NASA is enabling economic growth in low-Earth orbit to open access to space to more people, more science, and more companies than ever before. With a robust economy in low-Earth orbit, in which NASA is one of many customers, the agency can use its resources – along with our commercial, academic, and international partners -- for astronaut missions to explore the Moon as part of the Artemis program, and in preparation for human missions to Mars.

Rapper "Purchasing" an Exoplanet Statement

Media reported on July 22 that rapper Lil Uzi Vert is in the process of buying the exoplanet known as WASP-127b. Below is our response to calls for NASA comment:

- It's great to see such enthusiasm for the exploration of planets beyond our solar system, known as exoplanets. Curiosity about our universe is why we send spacecraft to learn about other planets and stars.

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While NASA has actively been involved for years in the discovery of exoplanets, the agency has no involvement in the reported attempt to "purchase" an exoplanet. Under international law, governments are not capable of granting, recognizing, or enforcing ownership interests in celestial bodies. Even the naming of such objects falls outside of NASA's purview and is the responsibility of the International Astronomical Union.

For background: Learn more about exoplanets like WASP-127b at *https://exoplanets.nasa.gov* Here is a page about this planet: *https://exoplanets.nasa.gov/exoplanet-catalog/3432/wasp-127-b/*

Private Spaceflights

Below is our response to the public and media who call for NASA comment about Virgin Galactic's July 11 and Blue Origin's July 20 suborbital private spaceflights:

- This year is truly a renaissance for human spaceflight both as we fly NASA and international partner astronauts on U.S. commercial crew spacecraft to the International Space Station and also as we see the expansion of private astronaut missions. As more people fly to space and do more things during their spaceflights, it attracts even more people to do more activities in low-Earth orbit and reflects the growing market we envisioned when we began NASA's Commercial Crew Program 10 years ago.

NASA, ESA Partner in New Effort to Address Global Climate Change

On July 13, NASA and ESA (European Space Agency) signed a statement of intent to address global climate change.

- NASA and ESA (European Space Agency) have formed a first-of-its-kind strategic partnership to observe Earth and its changing environment.
- The global climate is rapidly changing and the demand for accurate, timely, and actionable knowledge is more pressing than ever.
- NASA's partnership with ESA is an effort to help address and mitigate climate change through monitoring Earth with combined efforts of both agencies in Earth science observations, research, and applications.
- NASA Administrator Bill Nelson: "Climate change is an all-hands-on deck, global challenge that requires action – now. NASA and ESA are leading the way in space, building an unprecedented strategic partnership in Earth science. This agreement will set the standard for future international collaboration, providing the information that is so essential for tackling the challenges posed by climate change and helping to answer and address the most pressing questions in Earth science for the benefit of the United States, Europe, and the world."
- The partnership was formalized July 13 in a joint statement of intent that outlines:
    - How the agencies will collaborate to ensure continuity of Earth observations; Advance understanding of the Earth System, climate change and application of that knowledge; And collaborate on an open data policy that promotes open sharing of data, information, and knowledge within the scientific community and the wider public.
- NASA Associate Administrator for Science Thomas Zurbuchen: "Together, NASA and ESA provide most of the world's Earth science coverage through our Earth-observing satellites. This transformative agreement will build on that capability, forging a

critical international climate science partnership to tackle the most challenging climate questions in an integrated and strategic way. Not only will NASA and ESA work together to deliver unparalleled Earth science observations, research, and applications, but all of our findings will also be free and open for the benefit of the entire world as we work together to combat and mitigate climate change."

- The joint statement of intent complements activities underway for NASA's Earth System Observatory, which will design a new set of Earth-focused missions to provide key information to guide efforts related to climate change, disaster mitigation, fighting forest fires, and improving real-time agricultural processes..
- Climate adaptation and mitigation efforts cannot succeed without robust climate observations and research. NASA has more than two dozen satellites and instruments observing how the planet is changing and measuring key climate indicators, such as the height of oceans and inland waters, clouds and precipitation, and carbon dioxide.

Mission Equity

On June 15, NASA announced a new effort called Mission Equity that included issuing a Request for Information (RFI) seeking public input to broaden access to the agency.

- NASA has launched Mission Equity, a comprehensive effort to assess expansion and modification of agency programs, procurements, grants, and policies, and examine what potential barriers and challenges exist for communities that are historically underrepresented and underserved.
- NASA Administrator Bill Nelson said of Mission Equity:
    - "NASA is a 21st century agency with 22nd century goals. To be successful, it's critical that NASA takes a comprehensive approach to address the challenges to equity we see today. The agency's new Mission Equity is a bold and necessary challenge for NASA to ensure our programs are accessible to all Americans and, especially, those living in historically underserved communities across the country. Because when NASA opens doors to talent previously left untapped, the universe is the limit."
- NASA issued a request for information (RFI) on June 15, entitled Advancing Racial Equity and Support for Underserved Communities in NASA Programs, Contracts and Grants. To this RFI, the agency is seeking public feedback as it conducts a thorough review of its programs, practices, and policies to assess:
    - Potential barriers that underserved and underrepresented communities and individuals may face in agency procurement, contract, and grant opportunities.
    - Whether new policies, regulations, or guidance may be necessary to advance equity and opportunities in agency actions and programs.
    - How agency resources and tools can assist in enhancing equity, including advancing environmental justice.
- Areas in which the agency would like to receive comments include:
    - Diversity and Equal Opportunity at NASA and in the STEM Community
    - Opportunities for NASA to Leverage its Data, Expertise, and Missions to Help Underserved Communities
    - Barriers/Gaps to Accessing Current NASA Grants, Programs, and Procurements
    - Engagement and Outreach with Organizations and Individuals from Underserved and Underrepresented Communities

- Underserved and underrepresented communities include: Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality.
- Through the RFI process, NASA hopes to initiate vibrant, meaningful, and ongoing dialogues that will help the agency build and improve current agency policies, practices, and programs. NASA hosted a virtual public meeting July 13, during which agency officials discussed the RFI and corresponding agency goals.

Hurricanes and NASA

June 1 is the official start of hurricane season for the Atlantic Ocean.

- After 2020 brought a record number of named storms in 2020, NASA is once again prepared to help understand and monitor these storms from its unique vantage point of space.
- NASA develops and launches satellites for NOAA, which is the lead federal agency for forecasting hurricanes. But the science of hurricanes doesn't start – or end – with forecasting.
- Global warming is increasing the heat in the ocean basins and already making it more likely that storms will intensify faster and be stronger, a phenomenon NASA scientists continue to study deeply.
- With the challenge posed by climate change, NASA has never been more committed to innovation in Earth science research.
    - Our next-generation Earth System Observatory, announced on May 24, missions will help us understand extreme weather events and other climate-fueled hazards to inform the solutions of the future.
- NASA researchers and data also support U.S. stakeholders before, during and after storms make landfall.
    - Stages of NASA Data:
        - Pre-storm assessment (feed weather prediction and forecasting models)
        - Near-real-time assessment (identify potential impacts ahead of landfall)
        - Post-storm assessment (help identify needs for support after landfall)
        - Data access and visualization
- The NASA Disasters Mapping Portal takes disaster-related data and puts it into understandable, usable formats real-time use and application with the goal to bridge the gap between science products and the people who can use the data to assist in preparedness, response, mitigation, and recovery.
    - After a hurricane makes landfall, NASA satellites are in prime position to identify impacts such as damage, flood depth and extent, power outages, rainfall accumulation, landslide risk, and even soil moisture.
    - That information helps local governments, the Army Corps of Engineers, and FEMA monitor infrastructure failures and disruptions, isolate contaminated water supplies, and identify hotspots for urgent response needs.
- NASA also does plenty of its own deep research on hurricanes and tropical cyclone dynamics. A few examples among many:
    - NASA's Global Modeling and Assimilation Office is pioneering the use of ultra-high-resolution global weather and micro-climate models.

- The CPEX-AW airborne campaign planned in the Caribbean this August and September will pilot new technology to use LiDAR to better understand atmospheric winds and convective clouds in tropical storms.
- NASA's Jet Propulsion Laboratory (JPL) is studying the use of artificial intelligence/machine learning to improve hurricane prediction capabilities using NASA satellite data.

Search for Life, Technosignatures, and UAP/UFOs
Public and media interest in the topic of UAP/UFO (Unidentified Aerial Phenomena /Unidentified Flying Objects) has seen an uptick in recent weeks following reports related to the Department of Defense's release of three unclassified U.S. Navy videos. An unclassified preliminary report from the Office of the Director of National Intelligence was released June 25, which is when we posted a NASA article on what the agency is doing to search for life beyond Earth. And below is our response to the public and media who call for NASA comment:

- One of NASA's key goals is the search for life in the universe. To date, NASA has yet to find any credible evidence of extraterrestrial life; however, NASA is exploring the solar system and beyond to help us answer fundamental questions, including whether we are alone in the universe. We lead the U.S. government's search for extraterrestrial life, be it close to home, on the planets or moons of our solar system, or deeper into space.

  NASA does not actively search for UAPs and the lack of robust data is the central problem for scientific study of UAPs and to determine whether they are natural or human-made phenomena – there is no current data to support that UAPs or UFOs are evidence of alien technologies.

Webb Name Webb Telescope Name Statement
On May 7, Slate.com posted an article with the headline and sub-headline "The James Webb Space Telescope Hasn't Launched Yet. In One Way, It's Already a Relic. It will collect important data, but what does its name say about who it's for?" Below is our response to the public and media who call for comment:

- NASA is aware of concerns that have arisen about James E. Webb, and we are working with historians to examine his role in government. NASA named its next generation observatory, the James Webb Space Telescope, after its second administrator, who helped establish the Apollo Program that landed humans on the Moon. The agency made the naming decision in recognition of Webb's role in retaining an active science program at NASA in the agency's early years. Webb's work as administrator laid the groundwork for today's accomplishments, and science remains a critical part of NASA's work: to understand the universe, advance exploration, and inspire the next generation.

Fiscal Year 2022 NASA Full Budget Proposal
On May 28, the Biden-Harris Administration released the full budget proposal for Fiscal Year 2022.

- President's Fiscal Year 2022 budget requests $24.8 billion for NASA, an increase of more than 6% over what the agency received the previous year.

Overarching Points

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- This funding request demonstrates the president's commitment to NASA and the people across the agency and its partners who have worked so hard this past year under the most difficult circumstances and achieved unprecedented success.
- The NASA workforce and the American people should be encouraged by what they see in this budget request. It is an investment in our future, and it shows confidence in what this agency has to offer. We owe it to the president and the American people to be good and responsible stewards of every tax dollar invested in NASA.
- This budget request includes the strongest NASA budget ever for science, which will help address the climate crisis at home and abroad, as well as advance robotic missions that will pave the way for astronauts to explore the Moon and Mars.
- This is also the strongest budget for exploration since the Apollo program.
- This budget request will restore America's global standing, promote racial and economic equity, and drive economic growth.

<u>Supports Human Exploration of the Moon, Mars, and Beyond</u>

- The president's funding request increases funding for Artemis by $350 million and gives us the resources to advance America's bipartisan Moon to Mars space exploration plan, agreed to by the Administration and Congress.
- This request keeps us on the path toward a regular cadence of Artemis missions with crew to the Moon by the middle of the decade.
- NASA's human landing system contract award, with the goal of a human demonstration mission to the lunar surface by 2024, is under protest.
- NASA is currently reviewing the overall Artemis timeline based on appropriations and expected budget, and outcome of the human landing system protest. We hope to provide an updated Artemis timeline later this year following conclusion of the protest.
- The FY2022 budget request assumes an Artemis I launch no earlier than November 2021, an Artemis II launch no earlier than September 2023, followed by Artemis III targeted for late 2024 and Artemis IV for late 2025. Landing the first woman and first person of color on the lunar surface as part of the Artemis program will promote equity – signaling to every American they too can see themselves among the stars.
- With NASA's Space Launch System rocket and Orion spacecraft, as well as U.S. commercial partnerships with the human landing system and Gateway lunar outpost, we will send astronauts to the Moon to test technologies and exploration practices that will make future missions more productive than ever before.
- This budget funds an upgraded Space Launch System, known as Block1B, that can deliver larger cargos to lunar orbit.
- Gateway, built with our commercial and international partners, is important to sustainable lunar operations.
    - The foundation of our lunar outpost is targeted to launch no earlier than November 2024, with additional modules from our international partners launching later.
- We are working day and night to reduce risks and overcome the challenges of long-term human exploration of the Moon and Mars.
- The budget funds early design work and planning for additional surface architecture necessary including the lunar terrain vehicle and surface habitats to ensure our astronauts can explore more of the Moon than ever before and stay for increasingly longer periods of time in deep space.

- NASA's Lunar Surface Innovation Initiative is advancing technologies to support mission operations on the Moon. This budget includes funding for the preliminary design of a fission surface power system that could power operations on the Moon and Mars.

Furthers Robotic Exploration of the Solar System and the Universe

- This funding request also furthers robotic exploration of the solar system and the universe.
- The budget provides more than $650 million for the Mars Sample Return mission, the highest priority large mission in planetary science.
- It includes strong support for planetary defense, including the near-Earth objects (NEO) Surveyor mission to detect asteroids and comets that could potentially impact Earth.

Enhances Research and Development at NASA

- This funding request supports continued progress developing cutting-edge space technologies, transformative capabilities, and renewable energy, all of which feed the economy and create good paying American jobs.
- Investing in new technologies enhances NASA's missions and fosters the growing space economy.
- NASA routinely demonstrates new technologies, reducing overall risk and encouraging industry adoption. The budget includes $500 million for technology demonstrations.
- It fully funds the On-orbit Servicing, Assembly, and Manufacturing 1 (OSAM-1) mission. Robotically refueling a satellite and manufacturing and assembling spacecraft parts in-orbit will foster a more sustainable space economy.
- Launching next month, our Laser Communications Relay Demonstration will demonstrate a technology that can provide 10-100 times better data rates than commonly used radio frequency communications systems. In the coming years, we'll further refine laser communications technology for use in deep space.
- More than $280 million would be directed toward small business innovation research and technology transfer. The increase of $60 million will provide more money to small companies to research new ideas and develop innovative solutions to challenging problems.
- An investment in NASA and space infrastructure reaffirms our nation is the world's premier partner in space collaboration, and we will be for decades to come.
- We are investing in aviation to make our skies safer, our fuels cleaner, and to get you to your destination faster than ever before. This also includes investing in next-generation aeronautics research that will safely integrate automated aircraft systems with piloted airplanes.
    - This budget enhances American competitiveness in the global aviation industry including the first two flights of new X-57 and X-59 aircraft.
    - NASA aeronautics is leading transformation of the way people and goods are moved through Advanced Air Mobility (air taxis, drone cargo deliveries, etc.), an emerging market expected to be worth $115 billion a year by 2035.
        - It will help safely deliver revolutionary aviation capabilities to previously underserved local, regional, intraregional, and urban areas. NASA investments today will spur the advancements of tomorrow.
- The budget provides a $30 million increase to accelerate transformative science at the frontiers of biological and physical sciences research in space.

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Advances Climate Science

- Climate change has increasing economic and national security impacts, and this budget increases investments in climate research and science programs.
- This funding increases our ability to better understand Earth and how it works as an integrated system, from our oceans to our atmosphere and how it all impacts our daily lives.
- NASA is developing the next-generation Earth System Observatory. NASA's new Earth System Observatory will provide the world with an unprecedented understanding of our Earth's climate system, arming us with next-generation data critical to mitigating climate change, and protecting our communities in the face of natural hazards.
    - The Earth System Observatory will help improve our understanding of extreme weather events and our decision making on climate resilience, adaptation, and mitigation. It will also inform decisions that ensure communities have the resources they need to build resilience prior to these crises.
- Research on zero-emissions aviation
    - NASA Aeronautics is partnering with industry, academia and other agencies through the Sustainable Flight National Partnership to accomplish the aviation community's aggressive climate change agenda. Through advanced vehicle technologies, efficient airline operations and sustainable aviation fuels, collectively NASA and our federal government and industry partners aim to reduce carbon emissions from aviation by half by 2050, compared to 2005, and achieve net-zero emissions by 2060.
- NASA continues to lead the development of new small spacecraft capabilities. For example, small platforms can enable distributed observations for climate science.

Builds a Diverse Future STEM Workforce

- This budget invests in the Artemis Generation. It requests funding for NASA's STEM engagement efforts for the first time in five years to inspire the next generation of scientists, engineers, mathematicians, and explorers by supporting the agency's STEM efforts.
- With this budget, NASA will increase funding for Space Grant and MUREP and will work with university and consortia partners to implement initiatives focused on diversity, equity and inclusion.
- NASA taps into the skills of a diverse group of partners and reaches new groups through our small business programs, academic partnerships, and prizes, challenges, and crowdsourcing activities.
- The Space Technology Mission Directorate is collaborating with OSTEM's Minority University Research and Education Project to offer research planning grants and incentivize partnerships between minority-serving institutions and small businesses, setting them up to apply to NASA opportunities.

Continues Research on the International Space Station

- The space station is a convergence of science, technology, and human innovation that demonstrates new technologies and enables research not possible on Earth. The space station remains the springboard to NASA's next great leap in exploration, including future human missions to the Moon and eventually to Mars.

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- With continued support for the International Space Station and the Artemis program, the president welcomes the international community to join us as we push human exploration deeper into space.
- This budget supports early design maturation of multiple commercially owned and operated low-Earth orbit (LEO) destinations (free flyers) from which NASA, along with other customers, can purchase services and stimulate the growth of commercial activities in LEO.
- In addition to maintaining continuous U.S. access to a space station in LEO, these new and more cost-effective platforms will democratize access to space by lowering the barriers to entry for the next generation of researchers, technologists, and tourists.

UPCOMING EVENTS PUBLIC DATES

Below are the publicly listed dates of some high-profile activities/events/milestones in 2021 and 2022. Internal planning, target, and pre-decisional dates are not listed below as they're not official and public yet. The public dates listed are as specific as they can be, at this time. This list will be regularly updated, as appropriate. Text in red is newly updated public information:

- **Boeing Orbital Flight Test-2 – July 30 –** Boeing's uncrewed CST-100 Starliner OFT-2 (Orbital Flight Test-2) launch from Florida to the International Space Station
- **Northrop Grumman CRS-16 – Aug. 10:** Commercial resupply services mission launch to the International Space Station from Virginia
- **SpaceX CRS-23 – Late August:** Commercial resupply services mission launch to the International Space Station from Florida
- **Landsat 9 – September:** NASA and U.S. Geological Survey launch latest Earth observation satellite, Landsat 9, from California
- **Lucy – Oct 16:** NASA's Lucy mission to study the Trojan asteroids of Jupiter will launch from Florida
- **SpaceX Crew-3 – No Earlier than Oct. 31:** Crew-3 will launch to station from Florida
- **SpaceX Crew-2 Return – Early to mid-November:** Crew-2 returns to Earth
- **Webb Telescope – (Launch Readiness Date) Oct. 31:** NASA's James Webb Space Telescope to help answer questions about our cosmic origins launches from French Guiana
- **DART – Nov. 24:** Window opens to launch Double Asteroid Redirection Test from California, NASA's first flight demonstration for planetary defense
- **Webb Telescope – November/December:** The James Webb Space Telescope completes mission deployments/arrives in its L2 (second Lagrange Point) orbit about 29 days after launch
- **Artemis I – November:** NASA reviewing launch date for first integrated flight test of the uncrewed Space Launch System rocket and Orion spacecraft launches on a multi-week mission around the Moon
- **Orion splashdown – Late 2021:** NASA's Orion spacecraft splashes down on Earth following a multi-week mission around the Moon
- **Geostationary Operational Environmental Satellite-T – December:** NASA and NOAA's latest weather satellite, GOES-T, launches from Florida
- **CAPSTONE – Fall 2021:** NASA CubeSat to validate new navigation technologies and verify dynamics in Gateway's planned orbit will launch to space
- **Imaging X-Ray Polarimetry Explorer – Fall 2021:** NASA's IXPE mission to discover the secrets of black holes, pulsars, and other high-energy objects in the universe launches from Florida

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- **Boeing's Crew Flight Test – Late 2021, under review pending OFT-2:** Boeing's CFT earliest possible launch to space station from Florida
- **Boeing Starliner-1 – Under review pending earlier flight tests:** Launch date for first operational Boeing commercial crew launch to space station from Florida
- **Astronaut Candidates – Late 2021**: NASA will announce selections for the next class of astronaut candidates to begin training
- **Laser Comm – Under Review:** NASA's Laser Communications Relay Demonstration to test optical communications launches from Florida
- **Intuitive Machines' CLPS Flight – Early 2022:** Suite of robotic NASA payloads sent lunar surface as part of a Commercial Lunar Payload Services delivery. Landing takes place in the following weeks
- **Artemis II Crew Announcement – Early 2022:** NASA will announce the astronauts that will fly on the first crewed flight of Orion spacecraft and Space Launch System rocket for the Artemis II mission.
- **Astrobotic's CLPS Flight – 2022:** Suite of robotic NASA payloads sent to the lunar surface as part of a Commercial Lunar Payload Services delivery. Landing takes place in the following weeks.
- **X-57 – 2022 –** Flight test for NASA's first all-electric plane, X-57, at Armstrong Flight Research Center
- **Webb Telescope – Spring 2022:** First science images from the James Webb Space Telescope, about six months after launch
- **TROPICS Launch – Spring 2022:** Time-Resolved Observations of Precipitation structure and storm Intensity with a Constellation of Smallsats (TROPICS), a constellation of six CubeSats, will launch from Kwajalein Atoll in the Marshall Islands. The satellites will work together to provide near hourly updates of hurricanes and tropical cyclones
- **The next crew rotation mission to the International Space Station after NASA's SpaceX Crew-3 is targeted for no earlier than mid-April 2022:** The specific commercial crew partner's spacecraft and rocket will be determined at a later date
- **X-59 QueSST First Flight – (tentative June 1, 2022):** The first flight of the X-59 Quiet SuperSonic Technology (QueSST) aircraft will take place out of Lockheed flight facilities in Palmdale, California
- **Psyche – August 2022:** Window opens to launch Psyche from Florida, NASA's mission to study the metal-rich asteroid 16 Psyche.
- **Surface Water and Ocean Topography (SWOT) Launch – November 2022:** Launch of SWOT to observe details of the ocean's surface topography, and measure how water bodies change over time , jointly developed by NASA and the Centre National d'Études Spatiales (CNES), with contributions from the U.K. Space Agency (UKSA) and the Canadian Space Agency (CSA)
- **NISAR Launch (NASA + Indian Space Research Organization + synthetic aperture radars) – Late 2022:** Joint mission between NASA and the Indian Space Research Organization to track subtle changes in Earth's surface, spot warning signs of imminent volcanic eruptions, help to monitor groundwater supplies, track the melt rate of ice sheets tied to sea level rise, and observe shifts in the distribution of vegetation around the world

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- **PACE Launch (Plankton, Aerosol, Cloud, ocean Ecosystem) - 2022:** PACE will advance the assessment of ocean health by measuring the distribution of phytoplankton, tiny plants and algae that sustain the marine food web
- **TEMPO launch (Tropospheric Emissions Monitoring of Pollution) - 2022:** NASA's first Earth Venture Instrument mission will measure pollution of North America, from Mexico City to the Canadian oil sands, and from the Atlantic to the Pacific hourly and at high spatial resolution. TEMPO will be the first space-based instrument to monitor air pollutants hourly across the North American continent during daytime

AGENCY COMMUNICATION THEME PRIORITIES

For full key points and other products for all themes, visit: https://communications.nasa.gov.

Earth

NASA uses the vantage point of space to understand and explore our home planet, improve lives and safeguard our future.
Tagline: **Your Home. Our Mission.**

Flight

NASA explores new technologies to make aircraft greener and quieter, get you gate-to-gate safely and on time, and transform aviation into a new economic engine at all altitudes.
Tagline: **NASA is With You When You Fly.**

Humans in Space

NASA leads human space exploration in low-Earth orbit with commercial and international partners to enable missions to the Moon and Mars. International Space Station missions are a catalyst for economic development and the advancement of scientific knowledge and new technologies that improve our lives.
Tagline: **Leading Discovery, Improving Life on Earth.**

Moon to Mars

NASA is leading a sustainable return to the Moon with commercial and international partners to expand human presence in space and bring back new knowledge and opportunities.
Tagline: Moon Lights the Way.

Solar System & Beyond

NASA is exploring our Solar System and beyond, uncovering worlds, stars, and cosmic mysteries near and far with our powerful fleet of space and ground-based missions.
Tagline: **Discovering the Secrets of the Universe.**

Space Tech

NASA technologies advance capabilities for space exploration, promote America's global leadership in innovation and transform the world around us.
Tagline: **Technology Drives Exploration**

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RECENT HOT TOPICS

Quick Reference

Upcoming Events
Public Dates

Northrop Grumman CRS-16

Northrop Grumman's Commercial Resupply Services 16 (CRS-16) cargo mission to the international Space Station is targeted for launch on the company's Antares rocket on Tuesday, Aug. 10 from the Mid-Atlantic Regional Spaceport's Pad-0A at NASA's Wallops Flight Facility on Wallops Island, Virginia. A five-minute launch window opens at 5:56 p.m. EDT.

- Northrop Grumman's 16th contract resupply mission under the second Commercial Resupply Services contract with NASA is scheduled to deliver more than 8,200 pounds of cargo to the International Space Station. The company's Cygnus cargo spacecraft will arrive at the space station Thursday, Aug. 12 at approximately 4:45 a.m.
- The Cygnus will be filled with supplies and payloads including critical materials to directly support dozens of the more than 250 science and research investigations that will occur during Expedition 65. Highlights of space station research facilitated by this mission are:
    - The Redwire Regolith Print study, which demonstrates 3D printing in space using a material simulating rock and soil found on the surfaces of planetary bodies, such as the Moon.
    - Cardinal Muscle which will evaluate whether engineered human muscle cells cultured in microgravity are a valid model for studying muscle loss.
    - Blob, an ESA (European Space Agency) investigation, which will allow students to see how slime molds' behavior is affected by microgravity.
    - The Flow Boiling and Condensation Experiment (FBCE), an important fluid physics technology for future missions to the Moon and Mars.
    - A new spacecraft carbon dioxide removal technology that could help future explorers on the Moon and Mars breathe more easily.
    - KREPE, which will deploy when Cygnus re-enters the atmosphere and transmit data to test an affordable thermal protection system, also known as a heat shield.
    - Cygnus also will carry a new mounting bracket that astronauts will attach to the port side of the station's backbone truss during a spacewalk planned for late August. The mounting bracket will enable the installation of one of the next pair of new solar arrays at a later date.
- Northrop Grumman named this Cygnus spacecraft after former NASA astronaut Ellison Onizuka (OH'-nuh-zoo-kuh), who they selected in honor of his prominence as the first Asian American astronaut. Onizuka was hired in 1978 in the first class of diverse astronauts, and his first spaceflight was aboard space shuttle Discovery in January 1985 for STS-51-C. He lost his life aboard the space shuttle Challenger in 1986.
- The Cygnus spacecraft is scheduled to remain at the space station until November, when it will depart the orbiting laboratory.
- NASA leads human space exploration in low-Earth orbit with commercial and international partners to enable missions to the Moon and Mars. International Space Station missions are a catalyst for economic development and the advancement of scientific knowledge and new technologies that improve our lives.

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Boeing Orbital Flight Test-2
NASA continues to work side-by-side with Boeing to understanding the CST-100 Starliner's service module valve performance, including the unexpected indications some of the valves were in the closed position during its Aug. 3 launch attempt of Orbital Flight Test-2 (OFT-2) from Cape Canaveral Space Force Station in Florida. With troubleshooting ongoing in the United Launch Alliance Vertical Integration Facility at NASA's Kennedy Space Center in Florida, where Starliner will be powered and run through various procedures to help understand the issue, NASA will move forward with the launch and berthing of Northrop Grumman's cargo mission to the International Space Station scheduled for liftoff Aug.10. In parallel, managers and engineers with NASA and Boeing will continue to evaluate schedules based on where the troubleshooting efforts take them before deciding when the next official launch for the OFT-2 mission will take place. OFT-2 is the second uncrewed flight for Boeing's CST-100 Starliner spacecraft as part of the agency's Commercial Crew Program.

- NASA's Commercial Crew Program and our commercial industry partner, Boeing, are taking a major step on the path to regular human spaceflight launches to the International Space Station on American rockets and spacecraft from American soil.
- NASA's Boeing Orbital Flight Test-2 (OFT-2) will fly a full mission profile, testing end-to-end capabilities of the Starliner system from pre-launch to docking and undocking, to landing and recovery in the desert of the western United States. OFT-2 will provide valuable data toward NASA certifying Boeing's crew transportation system for carrying astronauts to and from the space station.
- OFT-2 is the second orbital flight for the CST-100 Starliner, and the first for the second crew module in the Starliner fleet. Boeing proactively announced it would fly a second orbital test on its own cost to prove the Starliner system meets NASA's requirements, including docking to the space station.
    - This flight test will build on the knowledge we gained during the first test (in December 2019), which didn't achieve all the planned objectives. This mission also will test the changes and improvements made to Starliner, and prove the system is ready to fly astronauts. Following a successful mission, we are targeting a launch late this year for NASA's Boeing Crew Flight Test - Starliner's first flight with astronauts aboard.
- For more than 20 years, humans have continuously lived and worked aboard the International Space Station, advancing scientific knowledge and demonstrating new technologies that enable us to prepare for human exploration to the Moon and Mars.
- NASA is enabling economic growth in low-Earth orbit to open access to space to more people, more science, and more companies than ever before. With a robust economy in low-Earth orbit, in which NASA is one of many customers, the agency can use its resources – along with our commercial, academic, and international partners -- for astronaut missions to explore the Moon as part of the Artemis program, and in preparation for human missions to Mars.

NASA Statement on GAO Ruling for Human Landing System
The following is the NASA statement in response to the U.S. Government Accountability Office (GAO) decision released July 30 on the human landing system protest:

- "NASA was notified Friday, July 30, that the U.S. Government Accountability Office has denied the protests filed by Blue Origin Federation and Dynetics and has upheld the agency's source selection of SpaceX to continue the development of its human landing

system. The decision enables NASA to award the contract that will ultimately result in the first crewed demonstration landing on the surface of the Moon under NASA's Artemis plan. Importantly, the GAO's decision will allow NASA and SpaceX to establish a timeline for the first crewed landing on the Moon in more than 50 years.

"NASA recognizes that sending American astronauts back to the Moon for the first time since the Apollo program and establishing a long-term presence on the Moon is a priority for the Biden Administration and is imperative for maintaining American leadership in space. In the face of challenges during the last year, NASA and its partners have made significant achievements to advance Artemis, including a successful hot fire test for the Space Launch System rocket. An uncrewed flight of Artemis I is on track for this year and a crewed Artemis II mission is planned for 2023.

"NASA is moving forward with urgency, but astronaut safety is the priority and the agency will not sacrifice the safety of the crew in the steadfast pursuit of the goal to establish a long-term presence on the Moon.

"As soon as possible, NASA will provide an update on the way ahead for Artemis, the human landing system, and humanity's return to the Moon. We will continue to work with the Biden Administration and Congress to ensure funding for a robust and sustainable approach for the nation's return to the Moon in a collaborative effort with U.S. commercial partners."

Russia International Space Station Science Module Statement
Russia's uncrewed Multipurpose Laboratory Module (MLM), named Nauka, docked to the International Space Station on July 29. The update below follows what happened after docking and serves as NASA's comments:

- Following the docking of the Multipurpose Laboratory Module (MLM), named Nauka, to the International Space Station July 29, Russian cosmonauts aboard the space station conducted leak checks between Nauka and the service module. Several hours later, the flight control team noticed the unplanned firing of MLM thrusters that caused the station to move out of orientation. Ground teams regained attitude control and the motion of the space station is stable.

  The crew was never and is not in any danger, and flight controllers in Mission Control Houston are monitoring the status of the space station as Russia's flight controllers continue to checkout the MLM.

Private Spaceflights
Below is our response to the public and media who call for NASA comment about Virgin Galactic's July 11 and Blue Origin's July 20 suborbital private spaceflights:

- This year is truly a renaissance for human spaceflight both as we fly NASA and international partner astronauts on U.S. commercial crew spacecraft to the International Space Station and also as we see the expansion of private astronaut missions. As more people fly to space and do more things during their spaceflights, it attracts even more people to do more activities in low-Earth orbit and reflects the growing market we envisioned when we began NASA's Commercial Crew Program 10 years ago.

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NASA, ESA Partner in New Effort to Address Global Climate Change
On July 13, NASA and ESA (European Space Agency) signed a statement of intent to address global climate change.

- NASA and ESA (European Space Agency) have formed a first-of-its-kind strategic partnership to observe Earth and its changing environment.
- The global climate is rapidly changing and the demand for accurate, timely, and actionable knowledge is more pressing than ever.
- NASA's partnership with ESA is an effort to help address and mitigate climate change through monitoring Earth with combined efforts of both agencies in Earth science observations, research, and applications.
- NASA Administrator Bill Nelson: "Climate change is an all-hands-on deck, global challenge that requires action – now. NASA and ESA are leading the way in space, building an unprecedented strategic partnership in Earth science. This agreement will set the standard for future international collaboration, providing the information that is so essential for tackling the challenges posed by climate change and helping to answer and address the most pressing questions in Earth science for the benefit of the United States, Europe, and the world."
- The partnership was formalized July 13 in a joint statement of intent that outlines:
    - How the agencies will collaborate to ensure continuity of Earth observations; Advance understanding of the Earth System, climate change and application of that knowledge; And collaborate on an open data policy that promotes open sharing of data, information, and knowledge within the scientific community and the wider public.
- NASA Associate Administrator for Science Thomas Zurbuchen: "Together, NASA and ESA provide most of the world's Earth science coverage through our Earth-observing satellites. This transformative agreement will build on that capability, forging a critical international climate science partnership to tackle the most challenging climate questions in an integrated and strategic way. Not only will NASA and ESA work together to deliver unparalleled Earth science observations, research, and applications, but all of our findings will also be free and open for the benefit of the entire world as we work together to combat and mitigate climate change."
- The joint statement of intent complements activities underway for NASA's Earth System Observatory, which will design a new set of Earth-focused missions to provide key information to guide efforts related to climate change, disaster mitigation, fighting forest fires, and improving real-time agricultural processes..
- Climate adaptation and mitigation efforts cannot succeed without robust climate observations and research. NASA has more than two dozen satellites and instruments observing how the planet is changing and measuring key climate indicators, such as the height of oceans and inland waters, clouds and precipitation, and carbon dioxide.

Hurricanes and NASA
June 1 is the official start of hurricane season for the Atlantic Ocean.

- After 2020 brought a record number of named storms in 2020, NASA is once again prepared to help understand and monitor these storms from its unique vantage point of space.

- NASA develops and launches satellites for NOAA, which is the lead federal agency for forecasting hurricanes. But the science of hurricanes doesn't start – or end – with forecasting.
- Global warming is increasing the heat in the ocean basins and already making it more likely that storms will intensify faster and be stronger, a phenomenon NASA scientists continue to study deeply.
- With the challenge posed by climate change, NASA has never been more committed to innovation in Earth science research.
    - Our next-generation Earth System Observatory, announced on May 24, missions will help us understand extreme weather events and other climate-fueled hazards to inform the solutions of the future.
- NASA researchers and data also support U.S. stakeholders before, during and after storms make landfall.
    - Stages of NASA Data:
        - Pre-storm assessment (feed weather prediction and forecasting models)
        - Near-real-time assessment (identify potential impacts ahead of landfall)
        - Post-storm assessment (help identify needs for support after landfall)
        - Data access and visualization
- The NASA Disasters Mapping Portal takes disaster-related data and puts it into understandable, usable formats real-time use and application with the goal to bridge the gap between science products and the people who can use the data to assist in preparedness, response, mitigation, and recovery.
    - After a hurricane makes landfall, NASA satellites are in prime position to identify impacts such as damage, flood depth and extent, power outages, rainfall accumulation, landslide risk, and even soil moisture.
    - That information helps local governments, the Army Corps of Engineers, and FEMA monitor infrastructure failures and disruptions, isolate contaminated water supplies, and identify hotspots for urgent response needs.
- NASA also does plenty of its own deep research on hurricanes and tropical cyclone dynamics. A few examples among many:
    - NASA's Global Modeling and Assimilation Office is pioneering the use of ultra-high-resolution global weather and micro-climate models.
    - The CPEX-AW airborne campaign planned in the Caribbean this August and September will pilot new technology to use LiDAR to better understand atmospheric winds and convective clouds in tropical storms.
    - NASA's Jet Propulsion Laboratory (JPL) is studying the use of artificial intelligence/machine learning to improve hurricane prediction capabilities using NASA satellite data.

Webb Name Webb Telescope Name Statement

On May 7, Slate.com posted an article with the headline and sub-headline "The James Webb Space Telescope Hasn't Launched Yet. In One Way, It's Already a Relic. It will collect important data, but what does its name say about who it's for?" Below is our response to the public and media who call for comment:

- NASA is aware of concerns that have arisen about James E. Webb, and we are working with historians to examine his role in government. NASA named its next generation observatory, the James Webb Space Telescope, after its second administrator, who

helped establish the Apollo Program that landed humans on the Moon. The agency made the naming decision in recognition of Webb's role in retaining an active science program at NASA in the agency's early years. Webb's work as administrator laid the groundwork for today's accomplishments, and science remains a critical part of NASA's work: to understand the universe, advance exploration, and inspire the next generation.

Fiscal Year 2022 NASA Full Budget Proposal

On May 28, the Biden-Harris Administration released the full budget proposal for Fiscal Year 2022.

- President's Fiscal Year 2022 budget requests $24.8 billion for NASA, an increase of more than 6% over what the agency received the previous year.

Overarching Points

- This funding request demonstrates the president's commitment to NASA and the people across the agency and its partners who have worked so hard this past year under the most difficult circumstances and achieved unprecedented success.
- The NASA workforce and the American people should be encouraged by what they see in this budget request. It is an investment in our future, and it shows confidence in what this agency has to offer. We owe it to the president and the American people to be good and responsible stewards of every tax dollar invested in NASA.
- This budget request includes the strongest NASA budget ever for science, which will help address the climate crisis at home and abroad, as well as advance robotic missions that will pave the way for astronauts to explore the Moon and Mars.
- This is also the strongest budget for exploration since the Apollo program.
- This budget request will restore America's global standing, promote racial and economic equity, and drive economic growth.

Supports Human Exploration of the Moon, Mars, and Beyond

- The president's funding request increases funding for Artemis by $350 million and gives us the resources to advance America's bipartisan Moon to Mars space exploration plan, agreed to by the Administration and Congress.
- This request keeps us on the path toward a regular cadence of Artemis missions with crew to the Moon by the middle of the decade.
- NASA's human landing system contract award, with the goal of a human demonstration mission to the lunar surface by 2024, is under protest.
- NASA is currently reviewing the overall Artemis timeline based on appropriations and expected budget, and outcome of the human landing system protest. We hope to provide an updated Artemis timeline later this year following conclusion of the protest.
- The FY2022 budget request assumes an Artemis I launch no earlier than November 2021, an Artemis II launch no earlier than September 2023, followed by Artemis III targeted for late 2024 and Artemis IV for late 2025. Landing the first woman and first person of color on the lunar surface as part of the Artemis program will promote equity – signaling to every American they too can see themselves among the stars.
- With NASA's Space Launch System rocket and Orion spacecraft, as well as U.S. commercial partnerships with the human landing system and Gateway lunar outpost, we will send astronauts to the Moon to test technologies and exploration practices that will make future missions more productive than ever before.

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- This budget funds an upgraded Space Launch System, known as Block1B, that can deliver larger cargos to lunar orbit.
- Gateway, built with our commercial and international partners, is important to sustainable lunar operations.
    - The foundation of our lunar outpost is targeted to launch no earlier than November 2024, with additional modules from our international partners launching later.
- We are working day and night to reduce risks and overcome the challenges of long-term human exploration of the Moon and Mars.
- The budget funds early design work and planning for additional surface architecture necessary including the lunar terrain vehicle and surface habitats to ensure our astronauts can explore more of the Moon than ever before and stay for increasingly longer periods of time in deep space.
- NASA's Lunar Surface Innovation Initiative is advancing technologies to support mission operations on the Moon. This budget includes funding for the preliminary design of a fission surface power system that could power operations on the Moon and Mars.

Furthers Robotic Exploration of the Solar System and the Universe

- This funding request also furthers robotic exploration of the solar system and the universe.
- The budget provides more than $650 million for the Mars Sample Return mission, the highest priority large mission in planetary science.
- It includes strong support for planetary defense, including the near-Earth objects (NEO) Surveyor mission to detect asteroids and comets that could potentially impact Earth.

Enhances Research and Development at NASA

- This funding request supports continued progress developing cutting-edge space technologies, transformative capabilities, and renewable energy, all of which feed the economy and create good paying American jobs.
- Investing in new technologies enhances NASA's missions and fosters the growing space economy.
- NASA routinely demonstrates new technologies, reducing overall risk and encouraging industry adoption. The budget includes $500 million for technology demonstrations.
- It fully funds the On-orbit Servicing, Assembly, and Manufacturing 1 (OSAM-1) mission. Robotically refueling a satellite and manufacturing and assembling spacecraft parts in-orbit will foster a more sustainable space economy.
- Launching next month, our Laser Communications Relay Demonstration will demonstrate a technology that can provide 10-100 times better data rates than commonly used radio frequency communications systems. In the coming years, we'll further refine laser communications technology for use in deep space.
- More than $280 million would be directed toward small business innovation research and technology transfer. The increase of $60 million will provide more money to small companies to research new ideas and develop innovative solutions to challenging problems.
- An investment in NASA and space infrastructure reaffirms our nation is the world's premier partner in space collaboration, and we will be for decades to come.

- We are investing in aviation to make our skies safer, our fuels cleaner, and to get you to your destination faster than ever before. This also includes investing in next-generation aeronautics research that will safely integrate automated aircraft systems with piloted airplanes.
    - This budget enhances American competitiveness in the global aviation industry including the first two flights of new X-57 and X-59 aircraft.
    - NASA aeronautics is leading transformation of the way people and goods are moved through Advanced Air Mobility (air taxis, drone cargo deliveries, etc.), an emerging market expected to be worth $115 billion a year by 2035.
        - It will help safely deliver revolutionary aviation capabilities to previously underserved local, regional, intraregional, and urban areas. NASA investments today will spur the advancements of tomorrow.
- The budget provides a $30 million increase to accelerate transformative science at the frontiers of biological and physical sciences research in space.

Advances Climate Science

- Climate change has increasing economic and national security impacts, and this budget increases investments in climate research and science programs.
- This funding increases our ability to better understand Earth and how it works as an integrated system, from our oceans to our atmosphere and how it all impacts our daily lives.
- NASA is developing the next-generation Earth System Observatory. NASA's new Earth System Observatory will provide the world with an unprecedented understanding of our Earth's climate system, arming us with next-generation data critical to mitigating climate change, and protecting our communities in the face of natural hazards.
    - The Earth System Observatory will help improve our understanding of extreme weather events and our decision making on climate resilience, adaptation, and mitigation. It will also inform decisions that ensure communities have the resources they need to build resilience prior to these crises.
- Research on zero-emissions aviation
    - NASA Aeronautics is partnering with industry, academia and other agencies through the Sustainable Flight National Partnership to accomplish the aviation community's aggressive climate change agenda. Through advanced vehicle technologies, efficient airline operations and sustainable aviation fuels, collectively NASA and our federal government and industry partners aim to reduce carbon emissions from aviation by half by 2050, compared to 2005, and achieve net-zero emissions by 2060.
- NASA continues to lead the development of new small spacecraft capabilities. For example, small platforms can enable distributed observations for climate science.

Builds a Diverse Future STEM Workforce

- This budget invests in the Artemis Generation. It requests funding for NASA's STEM engagement efforts for the first time in five years to inspire the next generation of scientists, engineers, mathematicians, and explorers by supporting the agency's STEM efforts.
- With this budget, NASA will increase funding for Space Grant and MUREP and will work with university and consortia partners to implement initiatives focused on diversity, equity and inclusion.

- NASA taps into the skills of a diverse group of partners and reaches new groups through our small business programs, academic partnerships, and prizes, challenges, and crowdsourcing activities.
- The Space Technology Mission Directorate is collaborating with OSTEM's Minority University Research and Education Project to offer research planning grants and incentivize partnerships between minority-serving institutions and small businesses, setting them up to apply to NASA opportunities.

Continues Research on the International Space Station

- The space station is a convergence of science, technology, and human innovation that demonstrates new technologies and enables research not possible on Earth. The space station remains the springboard to NASA's next great leap in exploration, including future human missions to the Moon and eventually to Mars.
- With continued support for the International Space Station and the Artemis program, the president welcomes the international community to join us as we push human exploration deeper into space.
- This budget supports early design maturation of multiple commercially owned and operated low-Earth orbit (LEO) destinations (free flyers) from which NASA, along with other customers, can purchase services and stimulate the growth of commercial activities in LEO.
- In addition to maintaining continuous U.S. access to a space station in LEO, these new and more cost-effective platforms will democratize access to space by lowering the barriers to entry for the next generation of researchers, technologists, and tourists.

UPCOMING EVENTS PUBLIC DATES

Below are the publicly listed dates of some high-profile activities/events/milestones in 2021 and 2022. Internal planning, target, and pre-decisional dates are not listed below as they're not official and public yet. The public dates listed are as specific as they can be, at this time. This list will be regularly updated, as appropriate. Text in red is newly updated public information:

- **Northrop Grumman CRS-16 – Aug. 10:** Commercial resupply services mission launch to the International Space Station from Virginia
- **Boeing Orbital Flight Test-2 – TBD –** Boeing's uncrewed CST-100 Starliner OFT-2 (Orbital Flight Test-2) launch from Florida to the International Space Station
- **SpaceX CRS-23 – Late August:** Commercial resupply services mission launch to the International Space Station from Florida
- **Landsat 9 – September:** NASA and U.S. Geological Survey launch latest Earth observation satellite, Landsat 9, from California
- **Lucy – Oct 16:** NASA's Lucy mission to study the Trojan asteroids of Jupiter will launch from Florida
- **NASA's SpaceX Crew-3 – No Earlier than Oct. 31:** Crew-3 will launch to the space station from Florida
- **NASA's SpaceX Crew-2 Return – Early to mid-November:** Crew-2 returns to Earth
- **Webb Telescope – (Launch Readiness Date) Oct. 31:** NASA's James Webb Space Telescope to help answer questions about our cosmic origins launches from French Guiana
- **DART – Nov. 24:** Window opens to launch Double Asteroid Redirection Test from California, NASA's first flight demonstration for planetary defense

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- **Webb Telescope – November/December:** The James Webb Space Telescope completes mission deployments/arrives in its L2 (second Lagrange Point) orbit about 29 days after launch
- **Artemis I – November:** NASA reviewing launch date for first integrated flight test of the uncrewed Space Launch System rocket and Orion spacecraft launches on a multi-week mission around the Moon
- **Orion splashdown – Late 2021:** NASA's Orion spacecraft splashes down on Earth following a multi-week mission around the Moon
- **Geostationary Operational Environmental Satellite-T – December:** NASA and NOAA's latest weather satellite, GOES-T, launches from Florida
- **CAPSTONE – Fall 2021:** NASA CubeSat to validate new navigation technologies and verify dynamics in Gateway's planned orbit will launch to space from New Zealand
- **Imaging X-Ray Polarimetry Explorer – Fall 2021:** NASA's IXPE mission to discover the secrets of black holes, pulsars, and other high-energy objects in the universe launches from Florida
- **Boeing's Crew Flight Test – Late 2021, under review pending OFT-2:** Boeing's CFT earliest possible launch to space station from Florida
- **Boeing Starliner-1 – Under review pending earlier flight tests:** Launch date for first operational Boeing commercial crew launch to space station from Florida
- **Astronaut Candidates – Late 2021**: NASA will announce selections for the next class of astronaut candidates to begin training
- **Laser Comm – Under Review:** NASA's Laser Communications Relay Demonstration to test optical communications launches from Florida
- **Intuitive Machines' CLPS Flight – Early 2022:** Suite of robotic NASA payloads sent lunar surface as part of a Commercial Lunar Payload Services delivery. Landing takes place in the following weeks
- **Artemis II Crew Announcement – 2022:** NASA will announce the astronauts that will fly on the first crewed flight of Orion spacecraft and Space Launch System rocket for the Artemis II mission.
- **Astrobotic's CLPS Flight – 2022:** Suite of robotic NASA payloads sent to the lunar surface as part of a Commercial Lunar Payload Services delivery. Landing takes place in the following weeks.
- **X-57 – 2022 –** Flight test for NASA's first all-electric plane, X-57, at Armstrong Flight Research Center
- **Webb Telescope – Spring 2022:** First science images from the James Webb Space Telescope, about six months after launch
- **TROPICS Launch – Spring 2022:** Time-Resolved Observations of Precipitation structure and storm Intensity with a Constellation of Smallsats (TROPICS), a constellation of six CubeSats, will launch from Kwajalein Atoll in the Marshall Islands. The satellites will work together to provide near hourly updates of hurricanes and tropical cyclones
- **The next crew rotation mission to the International Space Station after NASA's SpaceX Crew-3 is targeted for no earlier than mid-April 2022:** The specific commercial crew partner's spacecraft and rocket will be determined at a later date
- **X-59 QueSST First Flight – (tentative June 1, 2022):** The first flight of the X-59 Quiet SuperSonic Technology (QueSST) aircraft will take place out of Lockheed flight facilities in Palmdale, California

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- **Psyche – August 2022:** Window opens to launch Psyche from Florida, NASA's mission to study the metal-rich asteroid 16 Psyche.
- **Surface Water and Ocean Topography (SWOT) Launch – November 2022:** Launch of SWOT to observe details of the ocean's surface topography, and measure how water bodies change over time , jointly developed by NASA and the Centre National d'Études Spatiales (CNES), with contributions from the U.K. Space Agency (UKSA) and the Canadian Space Agency (CSA)
- **NISAR Launch (NASA + Indian Space Research Organization + synthetic aperture radars) – Late 2022:** Joint mission between NASA and the Indian Space Research Organization to track subtle changes in Earth's surface, spot warning signs of imminent volcanic eruptions, help to monitor groundwater supplies, track the melt rate of ice sheets tied to sea level rise, and observe shifts in the distribution of vegetation around the world
- **PACE Launch (Plankton, Aerosol, Cloud, ocean Ecosystem) - 2022:** PACE will advance the assessment of ocean health by measuring the distribution of phytoplankton, tiny plants and algae that sustain the marine food web
- **TEMPO launch (Tropospheric Emissions Monitoring of Pollution) - 2022:** NASA's first Earth Venture Instrument mission will measure pollution of North America, from Mexico City to the Canadian oil sands, and from the Atlantic to the Pacific hourly and at high spatial resolution. TEMPO will be the first space-based instrument to monitor air pollutants hourly across the North American continent during daytime

AGENCY COMMUNICATION THEME PRIORITIES

For full key points and other products for all themes, visit: https://communications.nasa.gov.

Earth

NASA uses the vantage point of space to understand and explore our home planet, improve lives and safeguard our future.
Tagline: **Your Home. Our Mission.**

Flight

NASA explores new technologies to make aircraft greener and quieter, get you gate-to-gate safely and on time, and transform aviation into a new economic engine at all altitudes.
Tagline: **NASA is With You When You Fly.**

Humans in Space

NASA leads human space exploration in low-Earth orbit with commercial and international partners to enable missions to the Moon and Mars. International Space Station missions are a catalyst for economic development and the advancement of scientific knowledge and new technologies that improve our lives.
Tagline: **Leading Discovery, Improving Life on Earth.**

Moon to Mars

NASA is leading a sustainable return to the Moon with commercial and international partners to expand human presence in space and bring back new knowledge and opportunities.
Tagline: Moon Lights the Way.

Solar System & Beyond

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NASA is exploring our Solar System and beyond, uncovering worlds, stars, and cosmic mysteries near and far with our powerful fleet of space and ground-based missions.
Tagline: **Discovering the Secrets of the Universe.**

Space Tech
NASA technologies advance capabilities for space exploration, promote America's global leadership in innovation and transform the world around us.
Tagline: **Technology Drives Exploration**

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