

FY 2020 Budget Request
Deep Space Exploration Systems
(\$ Millions)

	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024
Deep Space Exploration Systems	4,790.0	5,050.8	5,021.7	5,295.5	5,481.4	6,639.0	7,042.3
Exploration Systems Development	4,395.0	4,092.3	3,441.7	3,440.0	3,463.4	3,733.5	3,684.7
Orion Program	1,350.0	1,350.0	1,266.2	1,245.7	1,146.7	1,119.3	1,000.0
Space Launch System	2,150.0	2,150.0	1,775.4	1,857.5	1,933.0	2,221.2	2,253.3
Exploration Ground Systems	895.0	592.3	400.1	337.8	383.7	443.1	401.3
Exploration Research & Development	395.0	958.0	1,580.0	1,354.5	2,018.0	2,350.4	3,357.6
Advanced Exploration Systems	257.8	680.0	255.6	239.8	188.3	146.7	130.1
Adv Cislunar and Surface Capabilities	0.0	140.0	363.0	647.0	967.7	1,775.9	2,360.0
Gateway	17.2	0.0	821.4	377.7	777.0	787.8	757.5
Human Research Program	140.0	140.0	140.0	140.0	140.0	140.0	140.0

The FY 2020 Budget for the Deep Space Exploration Systems account consists of two areas, Exploration Systems Development (ESD) and Exploration Research and Development (ERD), which provide for the development of systems and capabilities needed for human exploration of space.

Exploration Systems Development (ESD)

ESD programs are working together to build the space transportation system made up of the Orion crew vehicle, Space Launch System (SLS) rocket, and Exploration Ground Systems (EGS). This system will enable the Agency’s new mission to extend human presence into the solar system, starting with a return to the Moon. The Budget fully funds the SLS, Orion, and EGS to launch at the earliest technically achievable Exploration Mission (EM)-1 and EM-2 launch dates. Due to ongoing challenges, these dates are under review pending completion of independent assessment of core stage production and the integrated mission schedule.

The Budget defers upgrades to the SLS known as “Block 1B”, which are not needed for missions planned during the first half of the 2020s. Funding is instead focused on completion of the initial version of the SLS and supporting a reliable SLS and Orion annual flight cadence. Deferring the Block 1B upgrades also enables accelerating other exploration activities critical to landing astronauts on the Moon in the 2020s.

The Orion program will continue final assembly and testing of the EM-1 vehicle at KSC and continue hardware production of the EM-2 crew vehicle at MAF and KSC.

The SLS rocket’s production and certification for flight will continue at MAF and MSFC along with engine and core stage testing at SSC. Key rocket components will be delivered to EGS at KSC for integration into the final flight launch vehicle with the Orion crew vehicle.

EGS will continue to prepare launch infrastructure and operations requirements in support of the SLS and Orion programs. Modifications to existing facility and command and control systems will be ongoing.

As an essential objective, NASA will explore approaches for reducing the costs of future exploration missions to enable a more expansive and sustainable exploration program.

Exploration Research and Development (ERD)

ERD is comprised of four areas: Lunar Gateway, Advanced Cislunar Surface Capabilities (ACSC), Advanced Exploration Systems (AES) and the Human Research Program (HRP). ERD will infuse technologies and research, and develop high-priority capabilities using a combination of unique in-house activities, competed research, public-private partnerships, and engagement with non-traditional industry sectors. ERD is developing and testing prototype systems, planning and developing flight missions to lunar orbit and the Moon, and conducting and enabling human research that will form the basis for future human spaceflight missions.

The FY 2020 President's Budget funds three major initiatives focused on enabling lunar exploration:

1. Gateway funding focuses on developing a small way station that will orbit the Moon and enable lunar landers and surface activities, to include a Power and Propulsion Element by 2022, and habitation, airlock, and logistics elements thereafter;
2. ACSC funding focuses on design analysis, technology maturation, system development and integration, and spaceflight demonstrations for a human lunar landing system. ACSC is developing human lunar landing, lunar robotic, and surface capabilities through commercial and international partnerships as well as in coordination with other NASA programs. This includes leveraging the SMD development of smaller landers for capabilities such as navigation and precision landing and investments through exploration technology and the lunar surface initiative.
3. AES funding includes next generation risk reduction and habitation capabilities. AES ground test habitation prototypes are being developed by private-public-partnerships to evaluate human factors for different habitat configurations, assess how the various systems interact together and with other capabilities like propulsion modules and airlocks, and provide platforms to test and ensure that the standards and common interfaces being considered are well designed. Additional risk reduction activities include advanced subsystems development such as avionics and Environmental Control and Life Support Systems (ECLSS). AES will continue to work on identifying and addressing knowledge gaps existing outside of the astronaut habitats. Major areas of work include space communication, near earth object monitoring, robotic precursor small satellites, and potential improvements on how spacecraft are powered

FY 2020 Budget Request
LEO and Space Flight Operations
(\$ Millions)

	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024
LEO and Spaceflight Operations	4,749.2	4,639.1	4,285.7	4,369.5	4,369.5	4,235.5	4,182.3
International Space Station			1,458.2				
Space Transportation			1,828.6				
Crew and Cargo Program			1,726.6				
Commercial Crew Program			102.0				
Space and Flight Support (SFS)			848.9				
Space Communications and Navigation			611.0				
Human Space Flight Operations			99.8				
Launch Services			88.6				
Rocket Propulsion Test			46.5				
Communications Services Program			3.0				
21st Century Space Launch Complex			0.0				
Commercial LEO Development			150.0				

The FY 2020 Budget for the LEO and Spaceflight Operations account consists of four areas, International Space Station, Space Transportation, Space and Flight Support and Commercial LEO Development.

International Space Station (ISS)

The Budget provides funding for the International Space Station as well as for new commercial space capabilities that will facilitate a transition to a more robust and cost-effective approach to human space activities near the Earth. By 2025, the Budget envisions commercial capabilities on the International Space Station as well as new commercial facilities and platforms to continue the American presence in Earth orbit.

As the world's only current crewed space-based multinational research laboratory and technology test bed, ISS is critical to the future of deep space human exploration. The ISS also:

- Promotes commerce in space through public-private partnerships as new commercialization concepts are explored.
- Advances exploration of the solar system and enables scientists to identify and quantify risks to human health and performance, develop countermeasures, and develop and test technologies that protect astronauts during extended human space exploration.
- Supports unique research and development opportunities in the areas of biological and physical sciences processes.
- Maintains the ISS international partnership that has brought together many spacefaring nations in peaceful cooperative activity.
- Supports current and planned Earth and Space Science observation missions.

Space Transportation

Continues NASA's partnership with U.S. commercial space industry to develop and operate safe, reliable, and affordable systems to transport crew to and from the ISS and low Earth orbit. This strategy supports more affordable and sustainable future human space transportation capabilities, bolsters American leadership, will allow us to reduce our current reliance on foreign providers for this service, and helps stimulate the American aerospace industry.

- Sustains NASA's ISS cargo supply function in partnership with American private industry.
- Continues to advance commercial spaceflight and generate American jobs.

Space and Flight Support

- Provides mission-critical space communications and navigation services to customer missions, including human, science, and commercial crew and cargo missions.
- Creates a new Communications Services Program to replace the current government-owned Space Network with commercial communications services and capabilities.
- Advances next generation space communication technologies including optical, Delay/Disruption Tolerant networking, and autonomous navigation.
- Supports the readiness and health of the crew for all NASA human spaceflight endeavors.
- Provides safe, reliable, and cost-effective launch services for civil sector missions, as well as gives launch-related support to over 40 NASA scientific spacecraft missions in various phases of development.
- Continues to strategically manage NASA's rocket testing core capability to meet U.S. rocket testing requirements.

Commercial LEO Development

- Stimulates a commercial low Earth orbit (LEO) space economy by partnering with U.S. private industry to enable development of LEO platforms and capabilities.
- Focuses on maintaining a continuous U.S. human presence in LEO – both with government astronauts and with private citizens – in order to support the utilization of space by U.S. citizens, companies, academia, and international partners.
- Supports enabling, developing, and deploying commercial orbital platforms that NASA will use for its low Earth orbit research and technology demonstration requirements once they are available, as well as stimulating non-NASA demand for such platforms.

Develops a policy that outlines the specifics on commercial ISS usage and pricing and ensures that NASA or ISS National Laboratory activities do not compete with capabilities and services provided by commercial LEO destinations.

FY 2020 Budget Request Exploration Technology

(\$ Millions)

	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024
Exploration Technology	760.0	926.9	1,014.3	976.1	995.4	964.4	943.1
Early Stage Innovation and Partnerships			123.4				
Technology Maturation			282.5				
Technology Demonstration			397.5				
SBIR and STTR			210.8				

Technology development is essential to achieving mankind's return to the moon, and human exploration of Mars. Exploration Technology serves as a catalyst for new technology required to “lead the return of humans to the Moon for long-term exploration and utilization (Space Policy Directive-1).”

Exploration Technology funds the new **Lunar Surface Innovation Initiative**, which aims to spur the creation of novel technologies needed for lunar surface exploration and accelerate the technology readiness of key systems and components, targeting the following efforts over the next five years:

- In Situ Resource Utilization, converting regolith to oxygen, lunar ice to water, and water to propellant.
- Nuclear Surface Power, building on the 2018 demonstration of a small, lightweight fission power system that would permit long duration crewed missions on the surface of the Moon; and
- Jumpstart space weather monitoring technologies, methods for dust mitigation, surface excavation and construction capabilities, and improvements to systems and components to allow survival through the cold lunar night.
- The Lunar Surface Innovation Initiative activities will be implemented through a combination of unique in-house activities, competitive programs, and public-private partnerships.

Exploration Technology also invests in technologies that benefit broader lunar exploration objectives, including flight demonstration of the following technologies within the five year budget horizon:

- Cryogenic Fluid Management, through Tipping Point partnerships with industry;
- Precision Landing with High Performance Spaceflight Computing, beginning with testing a powerful, rad-hardened, multicore processor that will enable advanced precision landing and autonomous operations; and
- Solar Electric Propulsion, and public-private partnerships to flight demonstrate in-space manufacturing and robotic assembly technologies used to build large structures in a space environment.

Furthermore, Exploration Technology supports exploration-related technology and research activities that also have relevance to achieving science goals and continues to keep an eye toward supporting Mars “tall pole” technology needs.

The Exploration Technology account includes the following programs:

Early Stage Innovation and Partnerships support basic research, applied research, and early technology development to spur innovations that transform future capabilities. The program cultivates new ideas and alternative approaches to solving difficult and far reaching exploration challenges by leveraging the technical capabilities of the experts across the nation; academia, industry, entrepreneurs, and the NASA Centers.

Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs leverage the Nation's innovative small business community to support early-stage research and development in support of NASA's mission in human exploration, science and aeronautics.

Technology Maturation advances disruptive exploration technologies that may eventually support exploration and potentially other missions from proof of concept to demonstration, maturing transformational and foundational technologies that primarily reside between early stage research and flight demonstration.

Technology Demonstration conducts system level ground-based testing to determine feasibility, as well as space flight demonstrations of technologies and systems to effectively transition technologies and new capabilities for NASA exploration missions and for use by other government agencies and industry.

FY 2020 Budget Request

Science

(\$ Millions)

	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024
Science	6,211.5	6,905.7	6,303.7	6,319.0	6,319.0	5,846.5	5,815.0
Earth Science	1,521.0	2,201.3	1,779.8	1,735.6	1,772.7	1,666.5	1,674.0
Planetary Science	2,217.9	2,100.4	2,622.1	2,277.3	2,659.4	2,409.4	2,360.9
Astrophysics	860.4	860.4	844.8	909.4	966.2	913.5	907.7
James Webb Space Telescope	433.7	375.1	352.6	415.1	175.4	172.0	172.0
Heliophysics	638.5	638.5	704.5	633.6	760.3	659.0	609.3

Includes four major science areas. Note that the James Webb Space Telescope is separated out from Astrophysics:

Planetary Science to explore the planetary bodies of our solar system. Included is the Lunar Discovery and Exploration program that supports public-private partnerships and innovative approaches to achieving human and science exploration goals, including the return of humans to the Moon, and the Planetary Defense program for near-Earth object detection and mitigation. The Budget provides continued funding for the Europa Clipper mission, the Mars 2020 mission, the Lucy and Psyche missions, the next New Frontiers mission, and radioisotope power systems for deep-space missions. The Budget also provides funding for a Mars Sample Return mission launching as early as 2026 that will bring samples collected by Mars 2020 back to Earth.

Astrophysics to study the universe and search for Earth-like planets, including the IXPE and GUSTO missions and the recently selected SPHEREx mission. IXPE and GUSTO are on track for launch in 2021. The Budget proposes to terminate the WFIRST mission. Given delays and cost growth with the James Webb Space Telescope, the Administration is not ready to proceed with another multi-billion-dollar space telescope.

James Webb Space Telescope to explore all phases of our cosmic history—from within our solar system to the most distant observable galaxies in the early universe, to everything in between. Webb will seek the first stars that formed in the early universe, observe the formation of galaxies and protoplanetary systems, and explore potentially habitable exoplanets. The budget request supports a launch of March 2021.

Heliophysics to study the Sun and its influence throughout the solar system, including the recently selected Interstellar Mapping and Acceleration Probe, the launch of ICON in 2019 and the Solar Orbiter Collaboration with ESA in 2020. The Budget includes funding to support the DRIVE initiative and interagency efforts to improve space weather predictive capabilities, both priorities in the Decadal Survey.

Earth Science to understand Earth as an integrated system leading to a greater understanding of our planet's natural processes. The Budget supports a robust Venture Class mission cadence; upcoming launches for Landsat-9, NISAR, and SWOT; and Designated Observables studies consistent with the Decadal Survey. Consistent with the FY 2019 Budget Request, proposes termination of two Earth science missions: PACE and CLARREO Pathfinder. While the PACE mission and CLARREO Pathfinder would

provide additional capabilities over existing satellites, they are lower priorities within the current fiscal environment.

Supports about 100 space missions

- About 40 missions currently preparing for launch and about 60 operating missions.
- In addition, ongoing flights of sounding rockets, aircraft, and high-altitude balloons.

Focuses on three interdisciplinary objectives

- Discovering the secrets of the Universe
- Searching for life in the Solar System and beyond
- Safeguarding and improving life on Earth

Invests in developing advanced technologies

- Providing novel partnership opportunities between commercial partners and NASA through the Lunar Discovery and Exploration program, a CubeSat/SmallSat initiative targeted at specific high-priority science goals, and other efforts.
- Developing optics and detectors to characterize habitable planets around other stars, instruments to look for signs of past or present life on Mars and other planetary bodies, and instruments to take the pulse of our planet.
- Engaging industry, academia, and other government labs via open, competitive solicitations.

Supports over 10,000 U.S. scientists

- Over 3,000 openly competed research awards with universities, industry, and government labs.
- World-leading research, frequently highlighted on the covers of *Science*, *Nature*, and major newspapers.

Includes partnerships with a dozen other Federal agencies and sixty other nations

- Collaborating with other science agencies and agencies that rely on scientific data including NSF, DOE, NOAA, USGS, FAA, USDA, DOI, EPA, and DOD.
- Partnering with longstanding and newly space-faring nations.
- Building and launching the nation's weather satellites for NOAA.

Provides benefits to our nation and our planet

- Leading the scientific exploration of the Earth, the solar system, and the universe beyond.
- Enhancing economic growth and improving quality of life via high-tech jobs and new technologies.
- Assisting responses to national and international disasters.

FY 2020 Budget Request

Aeronautics

(\$ Millions)

	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024
Aeronautics	690.0	725.0	666.9	673.6	680.3	587.1	587.0
Airspace Operations and Safety Program			121.2				
Advanced Air Vehicles Program			188.1				
Integrated Aviation Systems Program			233.2				
Transformative Aero Concepts Program			124.4				

NASA Aeronautics conducts research for transformational advances in the safety, capacity, and efficiency of the air transportation system and to sustain U.S. technological leadership in the aviation industry. The budget request supports four distinct programs within the Agency's aeronautics portfolio:

Airspace Operations and Safety Program (AOSP) works in close partnership with the FAA and the aviation community to enable modernization and transformation of the NAS to meet evolving user needs. The program is on the leading edge of research into increasingly autonomous aviation systems, including innovation in the management of Unmanned Aircraft Systems (UAS) traffic at low altitude and other novel aviation vehicles. The program is also pioneering the real-time integration and analysis of data to support system-wide safety assurance. In FY 2020, AOSP will:

- Complete a series of air traffic management demonstrations with the FAA, airlines, and airports that validate new capabilities that improve airport operating efficiency and complete the UAS Traffic Management Project to enable safe operations of small UAS at low altitude.
- Start a new Advanced Air Mobility project to enable the emergence of urban air mobility beginning with a series of demonstrations that will assess the maturity of key technologies.

Advanced Air Vehicles Program (AAVP) researches technologies to meet growing long-term civil aviation needs and conduct hypersonic research to meet national needs. The program works in close partnership with academia and industry to pioneer fundamental research and to mature the most promising technologies and concepts for transition to the aviation industry. In FY 2020, AAVP will:

- Develop concepts and technologies to solve the technical challenges associated with flight-testing a 1 MW electric propulsion system – enough energy to power 165 homes.
- Complete safety assessments of electric propulsion systems on electric vertical take-off and landing aircraft concept vehicles.

Integrated Aviation Systems Program (IASP) includes the low boom flight demonstrator project that will pave the way for eventual over-land commercial supersonic flight. The program explores, assesses, and demonstrates the benefits of the most promising technologies at an

integrated system level in a relevant environment, which is often in flight. The program develops and tests technologies to enable routine access of UAS into the NAS. In FY 2020, IASP will:

- Continue the build of the Low Boom Flight Demonstrator with next phase of hardware integration activities.
- Complete the UAS in the NAS Project's final series of technology demonstrations which will enable the development of operating standards for sensing and control systems in mid-size UAS.

Transformative Aeronautics Concepts Program (TACP) demonstrates initial feasibility of concepts supporting the discovery and development of new transformative solutions supporting the NASA Aeronautics strategy. In FY 2020, TACP will:

- Initiate flight test of flexible low-temperature shape memory alloys that will allow for cost-effective fuel burn reduction on transport aircraft.
- Award the third round of the competitive University Leadership Initiative proposals to address critical barriers to achieving Aeronautics strategic objectives.

FY 2020 Budget Request
Safety, Security, and Mission Services

(\$ Millions)

	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024
Safety, Security, and Mission Services	2,826.9	2,755.0	3,084.6	3,084.6	3,084.6	2,871.6	2,871.6
Center Management and Operations			2,065.0				
Agency Management and Operations			1,019.6				
Agency Management			390.4				
Safety and Mission Success			192.0				
Agency IT Services (AITS)			275.7				
Strategic Capabilities Asset Program			161.5				

Safety, Security, and Mission Services (SSMS) provides the capabilities, workforce, and facilities that enable NASA to meet national space policy priorities of scientific discovery, exploring and expanding the boundaries of human presence in space, and developing the technologies of tomorrow. These missions are accomplished by operating and maintaining NASA centers and facilities in ten states and the District of Columbia (Headquarters); and providing independent oversight that reduces risk to life and mission for NASA programs.

Institutional capabilities ensure that critical Agency operations are effective, efficient, and meet statutory, regulatory, and fiduciary responsibilities. Program capabilities ensure that competencies, technical skills and capabilities, and assets are readily available to meet programmatic requirements; mission and research endeavors are technically and scientifically sound; and Agency practices implemented at NASA Centers are consistent, safe and reliable.

NASA is addressing its top SSMS priority by increasing facility maintenance activities at all Centers to reduce risk to missions. Increased funding will help reduce the significant backlog of facility maintenance projects and requirements. The FY 2020 request continues NASA's increased investment in proactive maintenance initiatives such as the conditioned-based maintenance (CBM) program.

NASA continues to prioritize Agency Information Technology Services. The FY 2020 request includes new investments in critical IT infrastructure and enterprise solutions. Funding will continue to support modernizing Agency systems, increased automation, and optimized delivery of enterprise-wide IT service solutions.

In FY 2020, the budget, management, and oversight functions for the Aerosciences Evaluation and Test Capability that are currently spread among three other NASA Directorates will be transferred to the Strategic Capabilities Asset Program (SCAP) in SSMS. This move will improve the overall efficiency and effectiveness of managing Agency Testing Capabilities.

Center Management and Operations fund ongoing management, operations, and maintenance of NASA Centers and associated component facilities, including:

- **Center Institutional Capabilities** provide the basic support required to meet internal and external requirements; effectively manage human capital, information technology, and facility assets; responsibly execute financial management and acquisition responsibilities; and provide a safe, secure, and environmentally sustainable workplace.
- **Center Programmatic Capabilities** provide technical facilities, workforce expertise and skills, equipment, and other cross-cutting resources required to implement the programs at the Centers and ensure engineering and safety oversight of NASA programs.

Agency Management and Operations fund the management and oversight of Agency programs and functions, and performance of NASA-wide mission support activities, including:

- **Agency Management** supports executive-based, Agency-level functional and administrative management requirements and the operational activities at Headquarters.
- **Safety and Mission Success** activities help reduce the risk and loss of life and/or mission, in our manned and unmanned programs. The activities include engineering; safety and mission assurance; independent health and medical oversight; and independent software verification and validation.
- **Agency Information Technology Services** provide mission-enabling IT capabilities, risk-based cyber security, and a sustainable management approach to support NASA's diverse mission needs; Investments in critical IT infrastructure and enterprise solutions support modernization of Agency systems, increased automation, and optimization of enterprise-wide IT service solutions. The FY 2019 request increases Agency IT Services to strengthen cybersecurity capabilities and safeguard critical systems and data.

Strategic Capabilities Assets Program provide the skilled workforce and essential preventive maintenance to keep core test facilities available to meet the current and future Agency needs and to ensure core test facilities are in a state of readiness.

FY 2020 Budget Request
Construction & Environmental Compliance Restoration

(\$ Millions)

	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024
Construction & Envrmtl Compl Restoration	569.5	348.2	600.4	468.8	468.8	468.8	387.8
Institutional CoF			430.6				
Science CoF			15.3				
Exploration CoF			52.1				
Space Operations CoF			19.5				
Environmental Compliance and Restoration			82.9				

The CECR budget directly enables NASA’s portfolio of missions in aeronautics and space exploration. With installations in 14 states, NASA collectively manages \$39 billion in constructed assets with an inventory of over 5,000 buildings and structures. The FY 2020 budget provides significant investments necessary to renew and sustain test facilities, and divest of unneeded older, costly real property.

Institutional Construction of Facilities (CoF) funds capital repairs and improvement to ensure center infrastructure critical to achieving NASA’s space and aeronautics programs are safe, secure, environmentally sound, and operate efficiently. NASA seeks to achieve a sustainable and energy-efficient infrastructure by replacing old, inefficient, deteriorated buildings with new, efficient, high-performance buildings while reducing the footprint.

- In addition to critical repair projects, the FY 2020 budget provides \$51.0 million for construction of the Langley Research Center Flight Dynamics Research Facility. This state-of-the-art facility replaces obsolete facilities and enables development of the advanced aerodynamic technologies required for current and future missions. Enhanced facility capabilities include higher Reynolds numbers and dynamic pressures, lower flow turbulence for improved flow quality, closed flow path with variable flow control and mechanical cooling capabilities, and increased flexibility and cost effectiveness, and optimization of systems for operational and maintenance efficiency.
- The request also provides \$75.0 million for construction of the Flight Electronics Integration Facility (FEIF) at the Jet Propulsion Laboratory. The \$75 million is split funded with \$63 million coming from Institutional CoF and \$12 million funded from Science Mission Directorate’s Programmatic CoF. The FEIF consolidates multiple facilities into a single facility, effectively reducing risk to flight hardware and enabling more efficient operations and maintenance. The FEIF supports current and planned space science and earth science missions and instruments.
- The request also provides \$16.5 million for repair of the Stennis Space Center's High- Pressure Industrial Water System. The project will repair the 66-inch diameter water pipe and ancillary equipment within the rocket engine test complex. This system, which provides the water that is required for fire suppression, cooling the test stand deflector, and diffuser operations, is critical during rocket engine testing.

Programmatic Construction of Facilities projects to carry out specific Science, Exploration Systems, and Space Operations programmatic requirements. Funding in this category is realigned from the mission directorates to the CECR budget to effect statutory direction that all NASA construction projects be funded in the CECR account. Projects include the \$12 million from Science to support the FEIF, \$24.3 million to fund refurbishment and upgrade of the Environmental Control System (\$10.6 million) and the Converter Compressor Facility (\$13.7 million) that support KSC's Launch Complex 39B, and \$14.6 million to improve reliability of NASA's Deep Space Network. Funding associated with all program designs and out-year programmatic construction activities remains in program accounts.

Environmental Compliance and Restoration to support cleanup of hazardous materials and waste released to the surface or groundwater at NASA installations, NASA-owned industrial plants supporting NASA activities, current or former sites where NASA operations contributed to environmental problems, and other sites where the Agency is legally obligated to address hazardous pollutants. The FY 2020 budget provides \$82.9 million for remedial investigations, soil and groundwater cleanups at Santa Susana Field Laboratory, White Sands Test Facility, Kennedy Space Center, and Marshall Space Flight Center and continued operations of treatment systems and monitoring at the rest of the NASA centers and facilities.