COALITION for AEROSPACE and SCIENCE

May 18, 2022

The Honorable Jeanne Shaheen
Chair, Subcommittee on Commerce, Justice, Science and Related Agencies
Committee on Appropriations
125 Hart Senate Office Building
Washington, D.C. 20510

The Honorable Matt Cartwright
Chair, Subcommittee on Commerce, Justice, Science and Related Agencies
Committee on Appropriations
H-310, The Capitol
Washington, D.C. 20515

The Honorable Jerry Moran
Ranking Member, Subcommittee on Commerce, Justice, Science and Related Agencies
Committee on Appropriations
142 Dirksen Senate Office Building
Washington, D.C. 20510

The Honorable Robert Aderholt
Ranking Member, Subcommittee on Commerce, Justice, Science and Related Agencies
Committee on Appropriations
1036 Longworth House Office Building
Washington, D.C. 20515

Dear Chair Shaheen, Ranking Member Moran, Chair Cartwright, and Ranking Member Aderholt:

The Coalition for Aerospace and Science (CAS) is an alliance of prominent industry, academic, and scientific organizations united in support of robust and sustained federal investment in the National Aeronautics and Space Administration (NASA). **We request Congress appropriate at least $27.84 billion for Fiscal Year (FY) 2023, an ambitious but justifiable increase that maintains development of key Artemis program elements; continues development of a balanced portfolio of science missions and research; and provides the funding growth needed to accommodate new and expanded technology development programs and scientific endeavors that will support the next generation of breakthrough research and exploration.**

CAS appreciates House and Senate efforts to increase NASA's funding during the FY 2022 appropriations process despite the lower-than-expected allocations. As such, the Coalition's FY 2023 appropriations request of $27.84 billion is based on the laudable House and Senate FY 2022 marks that would have provided historic increases to NASA, plus a roughly 8 percent increase to insulate the Agency from the cost of projected inflation. This approach is consistent with past requests by CAS that always prioritized robust and inflation-adjusted growth.

NASA's broad profile of activities preserves the U.S.'s global leadership role in space and reflects the growth of the sector and increasing demands placed upon NASA and its partners. This budget addresses: (1) priorities from the two most recent National Academies' decadal surveys in astronomy and astrophysics and planetary science and astrobiology, (2) progress of the Artemis program in building a sustainable lunar architecture, including landing the first woman and the first person of color on the Moon in 2025, and (3) scientific and technological work preceding human exploration of Mars, all while maintaining an enduring American presence in low-Earth orbit (LEO). Stagnation in funding would undermine these critical efforts by jeopardizing existing schedules and creating uncertainty for our aerospace manufacturing and R&D workforces.

Each member of CAS works with NASA on critical research, missions, and programs throughout the agency. Thereby, each member of the coalition understands that healthy growth in funding and support

for NASA overall has a positive impact on individual priorities. CAS requests Congress give specific attention to the following programs.

SCIENCE

CAS requests at least $9 billion for NASA's Science Mission Directorate (SMD). This would maintain the current slate of SMD activities while accommodating the planned cost peaks of missions in development, enable new competitive mission opportunities across all mission sizes, and continue support for individual investigator grant programs that are crucial for supporting the next generation of researchers. NASA would also have resources to begin implementing recommendations from the recent decadal surveys in astrophysics and astronomy,[1] and planetary science and astrobiology[2]. Due to the timing of the decadals' release, NASA's FY 2023 request does not acknowledge these reports that represent the consensus of the science community, and SMD leadership has publicly stated that the earliest budget to reflect either's implementation is FY 2024. Additional rationale for CAS's request includes the following priorities:

- **Planetary Science:** The Coalition requests $3.6 billion for Planetary Science. This includes $822.3 million for Mars Sample Return to support launch of principal elements by 2028; $226 million for the Planetary Defense Coordination Office; $50 million for the Small Innovative Missions for Planetary Exploration (SIMPLEx) program to accelerate the next solicitation of small, targeted science missions to other planets; support for upcoming announcements of opportunities for the Discovery and New Frontiers programs; and funding to begin formulation for the highest-priority planetary flagship mission following Mars Sample Return: the Uranus Orbiter and Probe.
- **Earth Science:** The Coalition requests $2.4 billion for Earth Science. This funding level would support NASA's intent to compete a new Earth System Explorer PI-led mission class (including $25 million in FY 2023 for Phase A and increasing the total mission cap to $400 million for up to three missions), an $8 million increase to the Earth Science Technology Office ($110.3 million total) for a thermal/IR "Wildfire Early Warning" demonstration, and $8 million to establish the Earth Information Center. CAS also supports NASA's completion of its Earth System Observatory (ESO) by the end of the 2020s and encourages NASA to work with industry to the maximum extent possible to support completing the ESO constellation within the decade.
- **Astrophysics:** The Coalition requests $1.9 billion for Astrophysics and implementation of recommendations from the most recent astrophysics decadal survey. This includes $482.2 million for the Nancy Grace Roman Space Telescope; $245.6 million supporting the Astrophysics Explorer missions including the Compton Spectrometer and Imager (COSI) SMEX mission; $12.5 million to support an announcement of opportunity for the new Probe mission class in FY 2023, and the budgetary flexibility to begin funding the "Great Observatory" technology maturation activity that will provide the foundation necessary for the next generation of space-based observatories.
- **Heliophysics:** The Coalition requests $935 million for Heliophysics to continue the program of record, fund a range of novel missions, such as the recently selected HelioSwarm and Multi-slit Solar Explorer (MUSE) MIDEX missions, and support human space exploration efforts through improved characterization of the radiation environment around Earth, the Moon, and Mars.

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[1] National Academies of Sciences, Engineering, and Medicine. 2021. *Pathways to Discovery in Astronomy and Astrophysics for the 2020s*. Washington, DC: The National Academies Press. https://doi.org/10.17226/26141.
[2] National Academies of Sciences, Engineering, and Medicine. 2022. *Origins, Worlds, and Life: A Decadal Strategy for Planetary Science and Astrobiology 2023-2032*. Washington, DC: The National Academies Press. https://doi.org/10.17226/26522.

SPACE TECHNOLOGY

CAS requests $1.5 billion for the Space Technology Mission Directorate (STMD). Since its inception, STMD has focused on improving NASA's technological capabilities across a wide array of areas—from propulsion and power generation to materials science and high-performance computing—that help the agency achieve mission requirements across all its directorates. Specifically, CAS requests:

- $75 million to pilot a new "OPEN" solicitation modeled after the eponymous ARPA-E funding call, a highly successful and competitive triennial program that solicits "blue sky" technology development proposals. As the "ARPA" for space, STMD can expand its ability to leverage university-based, cross-disciplinary research through an "OPEN" mechanism that matures critical technologies (roughly TRL 4 at entry to TRL 6) aligned with its priority taxonomies. The current "Tipping Point" program in STMD targets this TRL range, however, eligibility and funding structure is oriented exclusively to industry.
- $300 million for industry and academic partnerships.
- $110 million for development and demonstration of a nuclear thermal propulsion system and $50 million for fission orbital or surface power for demonstration by 2027. Nuclear propulsion technology is especially relevant as a means to achieve the National Academies' recommended Uranus Orbiter and Probe mission with a shorter transit duration and greater ability to fully execute the mission's scientific objectives.
- In-space demonstrations of key technologies for long-term cryogenic fluid management, and the establishment of an On-orbit Servicing, Assembly and Manufacturing (OSAM) Consortium.

EXPLORATION SYSTEMS DEVELOPMENT

CAS requests $8.35 billion for the Exploration Systems Development Mission Directorate. NASA's human exploration agenda – and the global visibility and prestige it confers – is an unparalleled national asset that has spurred immeasurable economic, inspirational, and geopolitical benefits.

CAS requests Congress continue to support NASA's Artemis program and recommends an appropriation of **$2.6 billion for the Space Launch System, $1.45 billion for the Orion spacecraft, and $749.9 million for Exploration Ground Systems**. These foundational systems will soon begin launching a series of exploration missions as part of NASA's Artemis program that will not only carry Americans to the Moon, but will establish the critical infrastructure for humanity's first crewed missions to Mars. As we get closer to Artemis I and these programs transition from development to production, continued support from Congress is essential for program sustainability and extending what we learn from living and working on the Moon to the human exploration of Mars.

The Coalition requests **$1.5 billion for Human Landing Systems and $779.2 million for Gateway,** which is critical to sending Americans to the Moon and onto Mars. This recommendation will allow NASA to demonstrate industry-led human lunar landing systems, establish a sustainable exploration infrastructure around the Moon anchored by Gateway, and enable key technologies needed for Mars that also benefit humans back on Earth, such as in-situ resource utilization and advanced power systems. It also ensures funding for a second provider for human and high-value high-mass payload delivery, ensuring redundancy in capability and competition for performance, which will further scientific objectives.

SPACE OPERATIONS

CAS requests $4.05 billion for the Space Operations Mission Directorate (SOMD). The Coalition requests that SOMD maintain its support for the International Space Station and Commercial Crew and Cargo programs, as well as **Commercial LEO Development (CLD) of at least $224.3 million**. Given the uncertain future of the NASA-Roscosmos partnership, CAS encourages Congress allocate funding above this request to accelerate CLD activities and develop contingencies should Russia terminate its commitments to the partnership.

Additionally, CAS requests Congress mandate that NASA only consider launch proposals for domestic cargo and science payloads from domestic launch providers. NASA should be utilizing and benefiting from a competitive U.S. launch landscape and avoid placing any taxpayer funded cargo or exploration missions on foreign launch vehicles.

AERONAUTICS

CAS requests $1 billion for the Aeronautics Research Mission Directorate (ARMD). This would provide the much-needed increase in funding for subsonic, supersonic, and hypersonic flight technologies and flight demonstrations. Research from this directorate develops technologies that transform the way we fly by lowering operating costs, increasing flight efficiency, and reducing aviation related environmental impacts. ARMD is critical to the United States' leadership in hypersonic technologies and systems while also advancing research on Unmanned Aircraft Systems for safe integration into the national airspace system.

STEM ENGAGEMENT

CAS requests $154 million for the Office of STEM Engagement (OSTEM) and supports NASA's efforts to diversify its STEM workforce. NASA must attract, fully engage, and retain the best talent available in the face of stiff competition from other science and technology sectors. Within this amount, the Coalition requests **$65 million for the National Space Grant College and Fellowship program.** OSTEM's Space Grant program serves to strengthen and promote a national network of state-based programs in partnership with NASA to develop and sustain a diverse, adaptable, and competitive STEM workforce, improve student accessibility to STEM-based learning opportunities, and advance the nation's STEM workforce pathways to further the progress of space and Earth sciences and engineering that transforms our future and sustains American leadership.

Sincerely,

Aerospace Industries Association
Aerospace States Association
American Association for the Advancement of Science
American Astronautical Society
American Astronomical Society
American Geophysical Union
American Institute of Physics
American Society of Agronomy
Association of American Universities
Association of Public and Land-grant Universities
Ball Aerospace
Boston University
Consortium for Ocean Leadership
Cornell University
Crop Science Society of America

Florida State University
Geological Society of America
Georgia Institute of Technology
Harvard University
Institute of Electrical and Electronics Engineers
Leidos
Lockheed Martin Corporation
Massachusetts Institute of Technology
Northrop Grumman Corporation
Northwestern University
Optical Society of America
Penn State University
Planet Labs
Princeton University
Purdue University
Raytheon Company
Rocket Lab
Rolls Royce
Soil Science Society of America
SPIE – the international society for optics and photonics
Texas A&M University
The Ohio State University
The Planetary Society
United Launch Alliance
University Corporation for Atmospheric Research
University of Arizona
University of Colorado – Boulder
University of California – San Diego
University of Florida
University of Iowa
University of Notre Dame
University of Maryland – Baltimore County
University of Maryland – College Park
University of Michigan
University of New Hampshire
University of Texas at Austin
University of Washington
University of Wisconsin – Madison
Vanderbilt University
Washington State University
Woods Hole Oceanographic Institution