



April 13, 2018

The Honorable John Culberson
2161 Rayburn House Office Building
Washington, D.C. 20515

The Honorable Richard Shelby
304 Russell Senate Office Building
Washington, D.C. 20510

The Honorable José Serrano
2354 Rayburn House Office Building
Washington, D.C. 20515

The Honorable Jeanne Shaheen
506 Hart Senate Office Building
Washington, D.C. 20510

Dear Chairman Culberson, Ranking Member Serrano, Chairman Shelby and Ranking Member Shaheen:

The Coalition for Aerospace and Science (CAS) is an alliance of prominent industry, university, and science organizations united in our support for robust and sustained federal investments in the National Aeronautics and Space Administration (NASA). As a group, we believe that increasing federal support and maximizing the efficiency and effectiveness for this vital agency will help ensure our nation's scientific, industrial, and academic leadership long into the future. **As you allocate funding for Fiscal Year (FY) 2019, we urge you to provide NASA with at least \$21.7 billion for FY 2019, five percent above the funding level in the FY2018 Omnibus.**

Strong funding, a balanced portfolio of missions and research, and policies that encourage innovative collaborations are essential to our nation's leadership in science, expanding the frontiers of human exploration, new space technology and aeronautical technology development. NASA's long history of transformative advances in science and technology have positioned the U.S. as a world leader across many fields, driving strong U.S. exports, supporting jobs, and drawing the best and brightest students to American universities. As the nation addresses new problems and challenges, robust support for NASA is critical to fostering a 21st century economy and restoring America's global scientific and technological leadership.

Every member of CAS has unique concerns and requests. However, the entire coalition is united in our support and advocacy for NASA's critical research, missions, and programs. As NASA-wide stakeholders, we respectfully request that within the topline request, Congress take note of the following specific opportunities for progress and impact:

TECHNOLOGY

CAS requests at least \$796 million 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. As recently as 2016, the National Academies of Science, Engineering, and Medicine (NASEM) reaffirmed its support for this approach, asserting that a standalone technology development program is critical to meeting technology needs across the agency's mission portfolio.

More broadly, STMD has spurred the creation of a technology development ecosystem that spans numerous states—including those that do not host NASA centers—and supports industry and academic researchers alike. In so doing, STMD has created products and services that stimulate America's economy with new businesses, industries, and high-skilled, sustainable jobs. These activities underpin partnerships across government agencies with commercial space programs and international space entities. Ultimately, STMD enhances the United States' global economic competitiveness and international recognition as the principal driver in the field of space technology.

The Coalition is unified in its opposition to STMD becoming subsumed by another directorate and strongly advocates that its independence and standalone activities remain within the current structure. STMD's culture, strategy, and technology implementation approach is unique within the agency and has a proven, successful track record. It is imperative that Congress rejects the Administration's request to subsume STMD into another directorate.

HUMAN EXPLORATION AND SPACE OPERATIONS

The Coalition requests continued funding support for the **Orion Multi-Purpose Crew Vehicle and Space Launch System (SLS)** programs. For our nation to continue making progress towards human exploration beyond Earth orbit, it is vital to ensure these programs have the resources needed to build upon the progress already achieved on SLS and Orion – the foundational programs for future U.S. human exploration. Consequently, for FY2019, we are requesting \$2.15 billion for SLS, including no less than \$400 million for the SLS Exploration Upper Stage; \$1.35 billion for Orion; and at least \$557 million for Exploration Ground Systems – with the additional funds needed to complete the second Mobile Launch Platform and accelerate the crewed Orion EM-2 mission to the vicinity of the moon.

Furthermore, NASA should utilize SLS and Orion vehicles for the development of cislunar space – a region with the potential to vastly expand economic activity in space. The United States economy can benefit greatly from the commercial development of cislunar space, and it is vitally important for reasons of national security and foreign policy, as well, that the United States be at the forefront in cislunar development.

Regarding other parts of the **Human Exploration and Operations Directorate**, CAS recommends \$1.46 billion for the ISS, including for commercial cargo resupply. For the Commercial Crew program, which is important both to restore independent US access to the ISS and to increase the amount of science performed on it, CAS recommends \$2.11 billion. CAS commends the Administration's interest in developing a plan to privatize the day-to-day operations for ISS and research in Low Earth Orbit. We believe this will help to maintain this vital capability for continued U.S. operations and leadership in LEO, and CAS also supports the \$150 million requested for commercial LEO development to create new stakeholders to offset future operating costs. Realized savings should be applied to accelerate the deep space exploration program.

The Coalition requests that NASA only consider bids from cargo and science providers from domestic launch providers. NASA should be utilizing and benefiting from a competitive US launch

landscape and avoid putting any taxpayer funded cargo or exploration missions on foreign launch vehicles.

Finally, to support new deep space exploration capabilities, including NASA's Lunar Orbital Platform (LOP) - Gateway, CAS supports the Administration's request for \$889 million.

SCIENCE

The Coalition requests at least \$6.5 billion to fund NASA's **Science Mission Directorate (SMD)** and maintain a balance across the portfolio. This represents a five percent increase over the FY2018 enacted level. NASA science programs help us answer profound questions about Earth as well as our place in the universe. New knowledge made possible from SMD inspires future generations to pursue careers in science, technology, engineering and mathematics (STEM), sustaining U.S. leadership in groundbreaking discoveries.

The Coalition requests Congress continue to provide ample funding in order for the **Planetary Science Division** to adhere to the priorities set by the Planetary Science Decadal Survey. We applaud Congress' past support for exploring Europa, which the scientific community has determined offers one of the most promising extraterrestrial habitable environments in the solar system. Additionally, sufficient funding is necessary to ensure the Europa Clipper mission can meet target launch dates in the 2020s. The Coalition also supports ongoing missions on Mars and elsewhere – including the Mars2020 rover and preliminary sample return plans – as well as continued funding for future Discovery and New Frontiers missions in alignment with decadal priorities.

CAS requests robust funding for the **Earth Science Division (ESD)** to ensure continued support for key missions and programs. The Coalition appreciates the continued support in FY2018 for OCO-3, PACE, NISAR, CLARREO Pathfinder, and Earth-facing instruments on DSCOVR, and requests that Congress continue its funding in FY2019. These missions will advance science frontiers and provide critical data for society. For example, PACE will help us monitor the duration and impact of harmful algae blooms and CLARREO Pathfinder will enable industry and military decision-makers to more accurately assess natural hazards, such as flooding. Increased funding for ESD in FY2019 will be critical to responding to recommendations of the National Academy of Sciences' Earth Science and Applications from Space (ESAS) Decadal Survey report released earlier this year. An increase in funding for FY 2019 will be necessary to meet the report's top recommendations - Designated and Earth System Explorer mission classes – whose budgetary requirements begin rapidly increasing starting in FY 2020. Additionally, the Coalition requests that Congress direct NASA to competitively select these future missions to encourage responsible cost and schedule constraints, develop novel remote sensing technologies, and leverage the talents and expertise of scientists at universities and research institutions.

The Coalition requests strong support for the **Heliophysics Division**. Heliophysics will lead to a greater understanding of our Sun and will help to mitigate the hazards that solar activity poses to the ground- and space-based platforms that strengthen our national security, economic competitiveness, and scientific prowess. Robust support will allow for implementation of key community priorities outlined in the Space Weather Action Plan.

Additionally, increased funding for Heliophysics is needed to support missions under formulation and development and current Announcement of Opportunities (such as the Interstellar Mapping and Acceleration Probe, IMAP) within the Living with a Star, Solar Terrestrial Probes, and Explorer programs without jeopardizing the future of vital activities within the other elements of the HPD. These include new initiatives such as the *Diversify, Realize, Integrate, Venture Educate (DRIVE)*, Heliophysics Science Centers and increased support, jointly with NOAA, for “O2R/R2O” and computational programs in space weather research. Support for these programs is consistent with congressional intent for each NASA Division to make progress on the top recommendations of the Solar and Space Physics Decadal Survey.

Full funding for the **Astrophysics Division** will allow for continued progress on the balanced portfolio of Astronomy and Astrophysics Decadal Survey priorities, including the Wide Field Infrared Survey Telescope (WFIRST). WFIRST is the top-ranked large space mission in the most recent decadal survey. This next generation telescope will advance the search for life on planets outside our solar system, and its wide field instrument will provide a field of view of the sky that is 100 times larger than what is possible with the Hubble Space Telescope. CAS supports efforts by NASA to actively manage the scope of the mission during formulation to control costs and asks Congress to allow planned efforts to control costs to move forward. Abandoning this top scientific priority, as proposed in the President’s FY2019 budget, undermines future decadal surveys and erodes U.S. ability to develop future flagship missions as part of a world-leading program.

EDUCATION

The Coalition opposes the Administration’s proposed elimination of NASA’s Office of Education, and asks you to once again reject this proposal, as you did in FY18. NASA plays a pivotal role in inspiring and encouraging young people to pursue STEM disciplines of study and careers; engaging the broader public in NASA’s mission; and strengthening NASA and the nation’s workforce. The NASA Office of Education supports programs such as the Space Grant College and Fellowship Program and the Minority University Research and Education Project (MUREP).

The Space Grant program funds nearly 4,000 fellowships and scholarships for students in all 50 states and the District of Columbia who are pursuing a STEM career, allowing them to participate in NASA aeronautics and space projects integrating classroom learning with on-the-job training much like apprenticeships. Through MUREP, NASA provides competitively bid awards to minority-serving institutions to recruit and retain underrepresented and underserved students into STEM fields, preparing these students with marketable skills and practical work experience. Continued support for the Office of Education is vital to ensure the United States continues to train and inspire our next generation of scientists, engineers, and technicians in order to remain globally competitive.

AERONAUTICS

Beyond our requests for space programs, the Coalition also recommends at least \$790 million for the **Aeronautics Research Mission Directorate (ARMD)**, which will allow for an increase in funding for subsonic, supersonic and hypersonic flight technologies and flight demonstrators. This

directorates conducts and funds research that is vital to the continued leadership of our nation's aviation sector. Research from this directorate develops technologies that transform the way we fly by lowering operating costs while increasing efficiency and reducing aviation's environmental impact. Aviation contributes more than one trillion dollars annually to the U.S. economy, and it is vital we fund this research to continually improve the efficiency, safety and adaptability of our air transportation system. NASA's Aeronautics enterprise is also doing essential research to enable harnessing the potential of Unmanned Aircraft Systems by safely integrating their operations into the national airspace while assuring U.S. hypersonics research remain first rate.

Thank you for your consideration of our funding requests. We hope you will consider CAS as a resource as you work to craft FY2019 appropriations.

NASA Funding, numbers in millions

Account	FY17 Omnibus	FY18 Omnibus	FY19 President's Budget Request	FY19 CAS Request
Science	5,764.9	6,221.50	5,895.0	6,500.0
Space Technology	686.5	760	Moved to ERT	796.0
Aeronautics	660.0	685	633.9	790.0
<i>Orion Multi-purpose Crew Vehicle</i>	1,350.0	1,350	1,163.5	1,350.0
SLS	2,150.0	2,150	2,078.1	2,150.0
<i>SLS Exploration Upper Stage</i>	300	300	N/A	400.0
<i>Exploration Ground Systems</i>	429.0	895	428.2	557.0
<i>ISS</i>	1,450.9	N/A	1,462.2	1,460.0
<i>Commercial Crew Program</i>	1,184.8	N/A	731.9	2,110.0
<i>Advanced Exploration Systems</i>	0	N/A	889.0	889.0
NASA Overall	19,653.3	20,736.14	19,892.2	21,700.0

Member Organizations:

Aerospace Industries Association
 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
 Crop Science Society of America
 Geological Society of America
 Human Factors and Ergonomics Society
 Lockheed Martin Corporation
 Massachusetts Institute of Technology
 New Mexico State University

Northrop Grumman Corporation
Princeton University
Purdue University
Raytheon Company
Soil Science Society of America
SPIE – the international society for optics and photonics
The Planetary Society
United Launch Alliance
University Corporation for Atmospheric Research
University of Arizona

University of Colorado – Boulder
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