FY 2015 NASA Budget Comparison

Update 4

Consolidated Appropriations Act, 2014 (P.L. 113-76); President's FY 2015 NASA Budget Request; House passed NASA Authorization Act (H.R. 4412); Senate Commerce, Science & Transportation Committee (SCSTC) passed NASA Authorization FY 2015 (S. 1317); House passed FY 2015 Commerce, Justice, Science bill (H.R. 4660); Senate Appropriations Committee passed FY 2015 Commerce, Justice, Science Appropriations bill (S. 2437);

This document provides an overview of the President's FY 2015 NASA Budget request in comparison with the proposed NASA Authorization bills and the proposed FY 2015 Commerce, Justice, and Science Appropriations bills. The first section provides a comparison of funding levels provided by each top-line item. The analysis then looks in detail at the differences between the proposals within Science, Exploration, Space Operations, and Space Technology.

NASA Budget Proposals Overview – FY 2015 Funding

Budget Authority, $ in millions	Consolidated Approps, 2014 (P.L. 113-76)	President's FY 2015 NASA Base Budget Request	President's FY 2015 NASA Opportunity, Growth, and Security Initiative	House passed NASA Auth FY 2014 (H.R. 4412)	SCSTC Passed NASA Auth FY 2015 (S. 1317)	House passed FY 2015 CJS Approps Act (H.R. 4660)	SAC passed FY 2015 CJS Approps Act (S. 2437)
Science	5,151.2	4,972.0	187.0	5,151.2	5,234.4	5,193.0	5,200.0
Aeronautics Research	566.0	551.1	44.0	566.0	581.0	666.0	551.1
Space Technology	576.0	705.5	100.0	576.0	650.0	627.0	580.2
Exploration	4,113.2	3,976.0	350.0	4,113.2	4,522.0	4,167.0	4,367.7
Space Operations	3,778.0	3,905.4	101.0	3,778.0	3,948.0	3,878.0	3,830.8
Education	116.6	88.9	10.0	116.6	139.8	106.0	108.0
Cross-Agency Support	2,793.0	2,778.6	0.0	2,793.0	2,907.0	2,779.0	2,778.6
Construction and Environmental Compliance and Restoration	515.0	446.1	94.0	515.0	441.0	446.0	446.1
Inspector General	37.5	37.0	0.0	37.5	38.8	34.0	37.5
Total	**17,646.5**	**17,460.6***	**885.0**	**17,646.5**	**18,462.0**	**17,896.0**	**17,900.0**

* The FY 2015 budget request for NASA is $17,460.00 million, but the Administration has included supplemental NASA funding within its Opportunity Growth and Security Initiative of $885 million, which would increase NASA's total funding to $18,400.00 million in FY 2015.

President Obama's FY 2015 budget request for NASA includes a base budget request and a supplemental budget request. NASA's FY 2015 base budget request is $17,461.0 million. In addition, President Obama's budget includes a supplemental request of $885.0 million for NASA in FY 2015, which would be funded through his Opportunity, Growth and Security Initiative (OGSI) account. NASA's FY 2015 base budget request fits within the constructs of the $1.014 trillion discretionary FY 2015 budget cap set in the Bipartisan Budget Act of 2013 (P.L. 113-67). The additional $885 million is a part of the President's $56 billion Opportunity, Growth, and Security Initiative (OGSI), which is above the FY 2015 budget cap. President Obama has proposed to fully pay for the additional $56 initiative through a combination of changing the tax code and decreasing spending in other portions of the budget.

Science

Budget Authority, $ in millions	Consolidated Approps, 2014 (P.L. 113-76)	President's FY 2015 NASA Budget Request	President's FY 2015 NASA Opportunity, Growth, and Security Initiative	House passed NASA Auth FY 2014 (H.R. 4412)	SCSTC Passed NASA Auth FY 2015 (S. 1317)	House passed FY 2015 CJS Approps Act (H.R. 4660)	SAC passed FY 2015 CJS Approps Act (S. 2437)
Earth Science	1,826.0	1,770.3	--	1,826.0	1,836.0	1,750.0	1,831.9
Planetary Science	1,345.0	1,280.3	--	1,345.0	1,450.0	1,450.0	1,301.7
Astrophysics	668.0	607.3	--	668.0	670.0	680.0	707.8
James Webb Space Telescope	658.2	645.4	--	658.2	645.4	645.0	645.4
Heliophysics	654.0	668.9	--	654.0	633.0	668.0	671.2
Total	**5,151.2**	**4,972.0**	**187.0**	**5,151.2**	**5,234.4**	**5,193.0**	**5,200.0**

President's FY 2015 Budget Request for Overall Science Portfolio

In FY 2015 the President base budget requested $4,972 million for Science missions, $179 million below the funds appropriated for Science missions in FY 2014. However, the President requested an additional $187 million for Science missions in his Opportunity, Growth, and Security Initiative. The additional requested funds are as follows:

- $29.3 million for Orbiting Carbon Observatory (OCO)-3;
- $50 million for Pre-Aerosols, Carbon and Ecosystems (PACE);
- $35 million for Planetary Science – extended mission funding;
- $15 million for Radio Power Systems;
- $20 million for Research and Analysis;
- $20 million for Wide-Field Infrared Survey Telescope (WFIRST)/Astrophysics Focused Telescope Assets (AFTA);
- $18 million for Earth Science research and efforts related to the Big Earth Data Initiative and Climate Data Initiative;

FY 2015 Congressional Action

<u>House passed NASA Authorization Act (H.R. 4412):</u>

- The House passed NASA Authorization bill, under Section 301, would reaffirm that it is a sense of Congress that a "balanced and adequately funded set of activities, consisting of research and analysis grants programs, technology development, small, medium, and large space missions, and suborbital research activities, contributes to a robust and productive science program and serves as a catalyst for innovation and discovery." In addition, Section 301 of the bill would require the NASA Administrator, when proposing the funding of program and activities for NASA for each fiscal year, "to the greatest extent practicable, follow guidance provided in the current decadal surveys from the National Academies' Space Studies Board."
- Section 302 states that it is the "sense of Congress that conducting deep space exploration requires radioisotope power systems, and establishing continuity in the production of the material needed to power these systems is paramount to the success of these future deep space missions." Further, it is the "sense of Congress that Federal agencies supporting the Administration through the production of such material should do so in a cost effective manner so as not to impose excessive reimbursement requirements on the Administration."
- Therefore, section 302 would require the Director of the Office of Science and Technology Policy (OSTP) and the NASA Administrator, in consultation with other Federal agencies, to conduct an analysis of: "the requirements of the Administration for radioisotope power system material that is needed to carry out

planned, high priority robotic missions in the solar system and other surface exploration activities beyond low-Earth orbit; and the risks to missions of the Administration in meeting those requirements, or any additional requirements, due to a lack of adequate radioisotope power system material." The radioisotope thermoelectric generator analysis would be required to include:

  - First, details of NASA's "current projected mission requirements and associated timeframes for radioisotope power system material;"
  - Second, an explanation of "the assumptions used to determine the Administration's requirements for the material, including: the planned use of Advanced Stirling Radioisotope Generator technology; the status of and timeline for completing development and demonstration of the Advanced Stirling Radioisotope Generator technology, including the development of flight readiness requirements; and the risks and implications of, and contingencies for, any delays or unanticipated technical challenges affecting or related to the Administration's mission plans for the anticipated use of Advanced Stirling Radioisotope Generator technology;"
  - Third, an assessment of "the risk to the Administration's programs of any potential delays in achieving the schedule and milestones for planned domestic production of radioisotope power system material;"
  - Fourth, "outline a process for meeting any additional Administration requirements for the material;"
  - Fifth, "estimate the incremental costs required to increase the amount of material produced each year, if such an increase is needed to support additional Administration requirements for the material;"
  - Sixth, "detail how the Administration and other Federal agencies will manage, operate, and fund production facilities and the design and development of all radioisotope power systems used by the Administration and other Federal agencies as necessary;"
  - Seventh, "specify the steps the Administration will take, in consultation with the Department of Energy, to preserve the infrastructure and workforce necessary for production of radioisotope power systems and ensure that its reimbursements to the Department of Energy associated with such preservation are equitable and justified;"and
  - Eighth, "detail how the Administration has implemented or rejected the recommendations from the National Research Council's 2009 report titled 'Radioisotope Power Systems: An Imperative for Maintaining U.S. Leadership in Space Exploration.'"

- Section 303 states that the "direction of the unique competence of the Administration to the search for life's origin, evolution, distribution, and future in the Universe." Toward that end, "the Administration may use any practicable ground-based, airborne, or space-based technical means and spectra of electro-magnetic radiation."
- Section 304 states that it is the "sense of Congress that principal investigator-led small orbital science missions, including CubeSat class, University Explorer (UNEX) class, Small Explorer (SMEX) class, and Venture class, offer valuable opportunities to advance science at low cost, train the next generation of scientists and engineers, and enable participants in the program to acquire skills in systems engineering and systems integration that are critical to maintaining the Nation's leadership in space and to enhancing the United States innovation and competitiveness abroad." Therefore, section 304 would direct the NASA Administrator to conduct a review of the above mentioned small orbital science missions, including:
  - First, "the status, capability, and availability of existing small orbital science mission programs and the extent to which each program enables the participation of the university scientists and students;"
  - Second, "the opportunities such mission programs provide for scientific research;"

    - Third, “the opportunities such mission programs provide for training and education, including scientific and engineering workforce development, including for the Administration’s scientific and engineering workforce;” and
    - Fourth, “the extent to which commercial applications such as hosted payloads, free flyers, and data buys could provide measurable benefits for such mission programs, while preserving the principle of independent peer review as the basis for mission selection.”
    - The report would be due not later than 270 days after the date of enactment of H.R. 4412, and would include “recommendations to enhance principal investigator-led small orbital science missions conducted by the Administration in accordance with the results of the review.”
- Section 305 would direct the NASA Administrator to “carry out biennial reviews within each of the Science divisions to assess the cost and benefits of extending the date of the termination of data collection for those missions that exceed their planned missions’ lifetime.” The assessment would be required to take into consideration “how extending missions impacts the start of future missions.” In addition, the NASA Administrator, when deciding whether to extend a mission that has an operational component, would be required to “consult with any affected Federal agency and shall take into account the potential benefits of instruments on missions that are beyond their planned mission lifetime.” Therefore, section 305 would require the NASA Administrator to transmit to Congress “at the same time as the submission to Congress of the Administration’s annual budget request for each fiscal year, a report detailing any assessment” extending a mission beyond its planned lifetime “that was carried out during the previous year.”

SCSTC passed NASA Authorization Act (S. 1317):

- Section 322 would reaffirm that it is a sense of Congress “that a balanced and adequately funded set of activities, consisting of research and analysis grants, programs, technology development, small, medium, and large space missions, and suborbital research activities, contributes to a robust and productive science program and serves as a catalysis for innovation and discovery.” Further, the NASA Administrator “should set science priorities by following the guidance provided by the scientific community through the National Academies’ decadal surveys.”
- Section 303 would direct the NASA Administrator to “carry out biennial reviews within each of the Science divisions to assess the cost and benefits of extending the date of the termination of data collection for those missions that have exceeded their planned mission lifetime.” In conducting these assessments, the NASA Administrator would be required to consider:
    - First, “the potential continued benefit of instruments on missions that are beyond their planned mission lifetimes.”
    - Second, “the cost and schedule impacts, if any, of mission extension on other NASA activities and science missions.”
- In addition, “when deciding whether to extend science missions with an operational component,” the NASA Administrator would be required to “consult with the National Oceanic and Atmospheric Administration and any other affected Federal agency.”

House passed FY 2015 CJS Appropriations Bill (H.R. 4660):

- N/A

SAC passed FY 2015 CJS Appropriations Bill (S. 2437):

- N/A

Earth Science

About

From space, NASA satellites can view Earth as a planet and enable the study of it as a complex, dynamic system with diverse components: the oceans, atmosphere, continents, ice sheets, and life. The Nation’s scientific community can thereby observe and track global-scale changes, connecting causes to effects. Through partnerships with agencies that maintain forecasting and decision support systems, NASA improves national

capabilities to predict climate, weather, and natural hazards, manage resources, and support the development of environmental policy.

President's FY 2015 Earth Science Missions:

- $329.2 million for Earth Science Research and Analysis;
- 120.7 million for Computing and Management;
- $18.7 million for Global Precipitation Measurement;
- $109.5 million for Ice, Cloud, and land Elevation Satellite;
- $79.9 million for Soil Moisture Active and Passive;
- $64.4 million GRACE Follow-On;
- $518.8 million for Other Missions and Data Analysis within Earth Systematic Missions;
- $21 million for OCO-2;
- $206.6 million for Venture Class Missions;
- $38.5 million for Other Missions and Data Analysis within Earth Systems Science Pathfinder Missions;
- $176.1 million for Earth Science Multi-Mission Operations;
- $55.6 million for Earth Science Technology;
- $36.3 million for Applied Sciences;

FY 2015 Congressional Action

House passed NASA Authorization Act (H.R. 4412):

- The House passed NASA Authorization Act would authorize to appropriate $1,826 million for Earth Science programs in FY 2014.
- Section 341 states that "recognizing the contributions that Earth science and remote sensing have made to society over the last 50 years, the Administration shall continue to develop first-of-a-kind instruments that, once proved, can be transitioned to other agencies for operations." Therefore, the bill would require the NASA Administrator to "conduct research and development on new sensors and instruments that will mitigate the risks associated with the development of operational systems and long-term data continuity requirements by other agencies." Further, NASA would "not be responsible for the development of operational Earth science systems, including satellite, sensor, or instrument development, acquisition, and operations, as well as product development and data analysis, unless such work is conducted on a reimbursable basis that accounts for the full cost of the work." To that end, the NASA Administrator would be required to "use the Joint Agency Satellite Division structure, or a direct successor thereto, to manage this process on a fully reimbursable basis."
- Section 343 would prohibit "operational responsibility for Earth science or space weather missions or sensors" from being "transferred from any other Federal agency to the Administration, except as specifically authorized by law."
- Section 345 would prohibit NOAA from shifting to NASA the responsibility for "the development of Joint Polar Satellite System climate sensors, including the Total Solar Irradiance Sensor (TSIS-2), the Ozone Mapping and Profiler Suite-Limb (OMPS-L), or the Clouds and Earth Radiant Energy System (CERES-C)." Further, any effort by NASA "related to this work shall be conducted on a fully reimbursable basis, and executed by the Administration's Joint Agency Satellite Division or a direct successor thereto."
- Section 346 would reaffirm the policy that "the continuous collection and utilization of land remote sensing data from space are of major benefit in studying and understanding human impacts on the global environment, in managing the Earth's natural resources, in carrying out national security functions, and in planning and conducting many other activities of scientific, economic, and social importance." Therefore, the Director of the Office of Science and Technology Policy (OSTP) would be required to "take steps in consultation with other relevant Federal agencies to ensure, to the maximum extent practicable, the continuous collection of space-based medium-resolution observations of the Earth's land cover, and to ensure that the data are made available in such ways as to facilitate the widest possible use." However, the NASA Administrator would be prohibited from initiating "the

definition of requirements for land imaging capabilities unless this work is conducted on a fully reimbursable basis and executed by the Administration's Joint Agency Satellite Division or a direct successor thereto."

- Section 347 would require the NASA Administrator "to the extent possible and while satisfying the scientific or educational requirements of the Administration and, where appropriate, of other Federal agencies and scientific researchers, acquire, where cost-effective, space-based and airborne Earth remote sensing data, services, distribution, and applications from a commercial provider." In addition, the NASA Administrator would be required to, not later than 180 days after the date of enactment of this Act, submit a report to Congress on NASA's "efforts to carry out" acquisition of commercial Earth science data.

<u>SCSTC passed NASA Authorization Act (S. 1317):</u>

- The Senate Commerce Committee passed NASA Authorization Act would authorize to appropriate $1,836 million for Earth Science programs, $66 million above the President's FY 2015 base budget request.
- Section 301 states that Congress finds that:
    - First, "continuous, long-term Earth observation data supports the preparation for and management of natural and human-induced disasters, benefits resource management and agricultural forecasting, improves our understanding of climate, and encourages environmental and economic sustainability."
    - Second, "due to the scope of activities required, Earth science research and Earth observation are multi-agency endeavors requiring significant cooperation and information sharing among government, international, and scientific community partners."
    - Third, "in developing Earth observation technologies, conducting Earth science satellite missions, and providing research products to the scientific community, NASA plays a crucial role in advancing Earth science."
    - Fourth, "the loss of observation capabilities in Earth science, as predicted by the National Research Council's midterm update to its Earth Science Decadal Survey, risks reversing gains in weather forecasts accuracy, reducing disaster response capabilities, and creating an irreversible gap in Earth science data."
    - Section 301 also provides a sense of Congress that: "given the importance of Earth science and Earth observation data, NASA Earth science efforts should be conducted in coordination with other Federal agencies; and should be cognizant of international efforts and the needs of the scientific and businesses communities;" as well as, "whenever feasible, NASA and other Federal agencies should consider the potential for reducing costs by purchasing commercially available Earth science data and services."
- In addition, Section 301 would require a National Strategy for Earth Observation and a National Plan for Civil Earth Observations to prioritize Earth observation missions.
    - First, it would direct the Office of Science and Technology Policy, in implementing its National Strategy for Earth Observation and in developing a National Plan for Civil Earth Observations, to "prioritize Federal Earth science and observation investments based on: its assessment of Earth science and observation data requirements; the capability requirements as identified by the National Academies decadal surveys; the projected costs of Earth science missions and data gathering activities; and the projected and available budgets."
    - Second, it would direct NASA, "in prioritizing future Earth science and Earth observation missions and technology development under the National Plan for Civil Earth Observations" to "consider potential cost-reduction opportunities, including: if feasible, co-locating Earth science sensors on other satellites; and purchasing commercially available Earth science data and services, including launch access to orbital and sub-orbital space."
- Section 302 would reaffirm that "the continuous collection and utilization of land remote sensing data from space are of major benefit in studying and understanding human impacts on the global

environment, in managing the Earth's natural resources, in carrying out national security functions, and in planning and conducting many other activities of scientific, economic, and social importance." In addition, Congress would make the following findings:
    - First, "since 1972, the Landsat program has provided standardized scientific data, the continuity of which is essential to ensuring the value of Landsat in monitoring the environment, modeling and detecting changes in the global supply of natural resources, and updating maps relevant to national security."
    - Second, "Landsat data engages and benefits a broad group of national stakeholders, from Landsat data processors in South Dakota to coastal restoration planners in Louisiana, forest managers in Colorado, Texas, and West Virginia, fire risk assessors in California, and beyond."
    - Third, "the May 2013 operationalization of Landsat 8 is especially notable given the dramatic increase in the usage and economic value of Landsat data which has occurred since the 2008 adoption of free and open data polices."
    - Fourth, "rapidly proceeding with the definition and construction of the next global land-imaging system, Landsat 9 offers the potential for cost savings by taking advantage of the standing infrastructure and flight hardware used to construction Landsat 8 to sustain the highly successful Landsat partnership between the Administration and the United States Geological Survey."
    - Fifth, "according to the report of the National Academies of Sciences entitled 'Future U.S. Workforce on Geospatial Intelligence', remote sensing is one of the five core areas on which the current production and analysis of geospatial intelligence relies."
- Therefore, the NASA Administrator would be required to "use existing studies and data to initiate system definition and procurement of the next global land-imaging system in a manner consistent with the continuing Earth remote sensing data collection over multi-decade time periods." Further, the Administrator would be required, "to the extent practicable within funds available to the Administration, seek partnerships with institutions of higher education, and other Federal agencies, to support education of the next generation of remote sensing engineers, scientists, and analysts."

<u>House passed FY 2015 CJS Appropriations Bill (H.R. 4660):</u>

- The House passed FY 2015 Commerce, Justice, and Science Appropriations bill would appropriate $1,750 million for Earth Science programs, $20 million below the President's FY 2015 base budget request.
- The Committee Report states that "per direction from the Committee, NOAA will be analyzing the risk posed to the Joint Polar Satellite System 2 (JPSS-2) budget and schedule by the development of NASA's Radiation Budget Instrument (RBI), and a decision may ultimately be made to remove RBI from the JPSS-2 manifest." Further, in the event that such a decision was made, NASA would be required to "cease further development work on RBI until providing to the Committee a report outlining a new strategy (with budget and schedule estimates) for RBI development and launch."
- The Committee Report notes that the Appropriations' "recommendation does not include funds requested for the procurement of the Total Solar Irradiance Sensor 2 (TSIS-2)." The Committee Report explains that "NOAA currently lacks a strategy for the launch of TSIS-1, and no funds are provided to NOAA for the development of such a strategy in fiscal year 2015." Therefore, the "Committee does not believe it is prudent to invest in a follow-on instrument at this time."

<u>SAC passed FY 2015 CJS Appropriations Bill (S. 2437):</u>

- The SAC passed FY 2015 Commerce, Justice, and Science Appropriations bill would appropriate $1,831 million for Earth Science programs, $51 million above the President's FY 2015 base budget request.
- The Committee Report notes that the "Committee maintains the ongoing development of the Tier 1 Earth Science missions, and provides the full budget request for the Soil Moisture Active and Passive [SMAP] and the Ice, Cloud and land Elevation Satellite [IceSat-2] missions." In addition, "given the importance to water resource management, ice dynamics measurements, and earthquake and tsunami research, the Committee" would direct "NASA to provide sufficient funding to ensure that the dual L-band and S-band synthetic aperture radar mission can pass into formulation in mid-fiscal year 2015."

- The Committee would provide an additional $25 million the Pre-Aerosol, Clouds, Ecosystem [PACE] mission to "begin technology risk reduction and formulation studies." The Committee Report notes that by "starting this mission in fiscal year 2015, the gap in the essential Ocean Color time-series will be reduced by 2 to 3 years." The Committee believes that "restoring this data stream will better equip the ocean ecology, ocean biology, aerosol and cloud science communities to address challenges highlighted in the National Academies' Earth Science Decadal Survey."
- The Committee would provide an additional $4 million for a land imaging mission successor to Landsat 8. The Committee Report notes that "with Landsat 7 at risk for ending its mission life as early as 2017," it is 'deeply troubled at the potential loss of 8-day continuous terrestrial coverage now provided through the Landsat satellite series." The Committee Report goes on to state that the "Committee does not concur with various Administration efforts to develop alternative 'out of the box' approaches to this data collection—whether they are dependent on commercial or international partners." Therefore, the Committee would direct NASA to "proceed with an acquisition in fiscal year 2015 for a mission to launch a follow on to Landsat 8 by not later than 2020 that does not exceed a cost cap of $650,000,000, inclusive of all launch vehicle costs." The Committee would direct the mission to:
    - First, "maximize the utilization of non-recurring engineering efforts from Landsat 8 to maintain a relatively low level of project risk."
    - Second, "program reserves shall be limited to not more than 10 percent for the duration of the mission's development and all hardware contracts should be firm fixed price and reflect steep discounts over the price paid for comparable components for Landsat 8."
- Finally, the Committee Report notes "that the notional land imaging fiscal year 2016 budget is now more than $100,000,000 below what is needed for a 2020 launch." Therefore, the Committee "expects the 2016 budget to reflect resources necessary to meet that launch date."
- The Committee would transfer "development costs and responsibility of Jason-3 and the Deep Space Climate Observatory [DSCOVR] from the National Oceanic and Atmospheric Administration [NOAA] to NASA within the funding provided for Earth Systematic Missions." The Committee would provide "additional funds on top of the requested amounts for these two missions to account for funding that had been requested within NOAA," which would result in "$25,600,000 for Jason-3 and $24,800,000 for DSCOVR."

Planetary Science

About

To answer questions about the solar system and the origins of life, NASA sends robotic space probes to the Moon, other planets and their moons, asteroids and comets, and the icy bodies beyond Neptune.

President's FY 2015 Planetary Science Missions:

- $165.4 million for Planetary Science Research and Analysis;
- $4.0 million for Directorate Management;
- $40.0 million for Near Earth Object Observations;
- $46.4 million for Other Missions and Data Analysis within Planetary Science Research;
- $170.0 million for InSight;
- $60.8 million for Other Missions and Data Analysis within Discovery;
- $224.8 million for Origins-Spectral Interpretation-Resource Identification-Security-Regolith Explorer;
- $56.6 million for Other Missions and Data Analysis within New Frontiers;
- $279.3 million for Mars Exploration;
- $95.7 million for Outer Planets;
- $137.2 million for Technology;

FY 2015 Congressional Action

House passed NASA Authorization Act (H.R. 4412):

- The House passed NASA Authorization Act would authorize to appropriate $1,345 million for Planetary Science programs in FY 2014.
    - Section 321 would direct the NASA Administrator to "ensure, to the greatest extent practicable, that the Administration carries out a balanced set of planetary science programs in accordance with the priorities established in the most recent decadal survey for planetary science." Section 321 states that "such programs shall include, at a minimum: a Discovery-class mission at least once every 24 months; a New Frontiers-class mission at least once every 60 months; and at least one Flagship-class mission per decadal survey period, starting with a Europa mission with a goal of launching by 2021."
- Section 322 would make the following Congressional findings:
    - First, "near-Earth objects pose a serious and credible threat to humankind, as many scientists believe that a major asteroid or comet was responsible for the mass extinction of the majority of the Earth's species, including the dinosaurs, nearly 65,000,000 years ago."
    - Second, "similar objects have struck the Earth or passed through the Earth's atmosphere several times in the Earth's history and pose a similar threat in the future."
    - Third, "several such near-Earth objects have only been discovered within days of the objects' closest approach to Earth, and recent discoveries of such large objects indicate that many large near-Earth objects remain to be discovered."
    - Fourth, "the efforts taken to date by the Administration for detecting and characterizing the hazards of near-Earth objects must continue to fully determine the threat posed by such objects to cause widespread destruction and loss of life."
- Therefore, Section 322 would direct the NASA Administrator to "continue to discover, track, catalogue, and characterize the physical characteristics of near-Earth objects equal to or greater than 140 meters in diameter in order to assess the threat of such near-Earth objects to the Earth, pursuant to the George E. Brown, Jr. Near-Earth Object Survey Act." Further, it would be "the goal of the Survey program to achieve 90 percent completion of its near-Earth object catalogue (based on statistically predicted populations of near-Earth objects) by 2020." In addition, Section 322 would require the Director of the Office of Science and Technology Policy and the NASA Administrator to transmit to Congress an initial report, not later than 1 year after the date of enactment of the H.R. 4412, that includes:
    - First, "recommendations for carrying out the survey program and an associated proposed budget."
    - Second, "analysis of possible options that the Administration could employ to divert an object on a likely collision course with Earth."
    - Third, "a description of the status of efforts to coordinate and cooperate with other countries to discover hazardous asteroids and comets, plan a mitigation strategy, and implement that strategy in the event of the discovery of an object on a likely collision course with Earth."
    - In addition, the report would be required to provide annually: (a) "a summary of all activities taken pursuant to" the near-Earth objects survey; and (b) "a summary of expenditures of all activities pursuant to" the near-Earth objects survey since the date of enactment of the H.R. 4412.
- Section 324 would require the NASA Administrator to transmit to Congress a report "describing how the Administration can expand collaborative public-private partnerships to study life's origin, evolution, distribution, and future in the Universe."

SCSTC passed NASA Authorization Act (S. 1317):

- The Senate Commerce Committee passed NASA Authorization Act would authorize to appropriate $1,450 million for Space Science programs, $169 million above the President's FY 2015 base budget request.
- Section 324 states that Congress finds, with regard to planetary science, that:

    - First, NASA's "support for planetary science is critical to enabling greater understanding of the solar systems and its origin."
    - Second, "the United States leads the world in planetary science and can augment its success with appropriate international partnerships."
    - Third, "a mix of small-, medium-, and large-planetary science missions is required to sustain a steady cadence of planetary exploration."
    - Fourth, "robotic planetary exploration is a key component of preparing for future human exploration."
- Therefore, "in accordance with the priorities established in the most recent decadal survey for planetary science," the NASA Administrator would be required to "ensure, to the greatest extent practicable, the completion of a balanced set of Discovery, New Frontiers, and Flagship missions." Further, the NASA Administrator "may seek, if necessary, adjustments to mission priorities, schedule, and scope in light of changing budget projects."
- In addition, "to support its science mission priorities," the NASA Administrator would be required to "invest in a sustained program to develop or mature scientific instrument capabilities, as delineated in the NASA Science Instruments, Observatories, and Sensor Systems Roadmap."

<u>House passed FY 2015 CJS Appropriations Bill (H.R. 4660):</u>

- The House passed FY 2015 Commerce, Justice, and Science Appropriations bill would appropriate $1,450 million for Planetary Science programs, $170 million above the President's FY 2015 base budget request.
- The Committee Report states that "NASA's request for Planetary Science once again represents a substantial decrease below appropriated levels and would have a negative impact on both planned and existing missions." The Committee Report notes that "recommended funding levels attempt to rectify this problem by supporting both the formulation and development of new Planetary Science missions and the extension of all healthy operating missions that continue to generate good scientific output." The Committee recommendations provides:
    - $170 million for Planetary Science Research and Analysis;
    - $286 million for New Frontiers, of which not less than $5 million is for Future New Frontiers Missions;
    - $302 million for Mars Exploration, of which not less than $100 million is for "a Mars Rover 2020 that meets scientific objectives laid out in the most recent Planetary Science decadal survey;"
    - $266 million for Discovery, of which not less than $30 million is for Future Discovery Missions;
    - $181 million for Outer Planets, of which not less than $100 million is for "a Europa Clipper or comparable mission that meets the scientific objectives laid out in the most recent Planetary Science decadal survey and can be launched in 2021;" and
    - $155 million for Planetary Science Technology, of which $18 million is for "assessments and development of promising technologies and techniques for the study and characterization of the surface and subsurface of Europa, including such technologies as landers, rovers, penetrators, submersibles, seismometers and sample analyzers."
- Further, with regard to the Europa Clipper mission as mentioned above, would be required to "support the completion of science definition, the selection of a mission concept, the release of an instrument Announcement of Opportunity (AO) and other necessary pre-formulation and formulation activities for the Europa mission." In addition, the Committee Report goes on to state that "while NASA has dedicated some Fiscal Year 2014 Europa funding to studying the possibility of conducting this mission within a $1,000,000,000 cost cap, the Committee has not seen any credible evident that such a cost cap is feasible." Therefore, the Committee would direct "NASA not to use further project resources in pursuit of such an unlikely outcome." Finally, the Committee would direct "NASA to evaluate the potential benefit of using the SLS as the launch vehicle for this mission."
- With regard to the Discovery Missions, the Committee "notes that NASA allowed a four year gap to develop between the release of the last Discovery Announcement of Opportunity (AO) in fiscal year 2010 and the expected release of the next AO in fiscal year 2014 (a gap which would have been worse

were it not for additional resources provided by the Congress).” Therefore “in order to prevent the recurrence of such a gap in the future and to firmly establish the 24 month mission cadence recommended by the Planetary Science decadal survey, NASA” would be required to “ensure that the planned 2017 Discovery AO is issued instead during fiscal year 2016.” Further, the Committee would direct that “future Discovery Mission funds not required for the planning, release and/or evaluation of Discovery AOs shall be used for development of instruments through the Stand Alone Missions of Opportunity program.”

SAC passed FY 2015 CJS Appropriations Bill (S. 2437):

- The SAC passed FY 2015 Commerce, Justice, and Science Appropriations bill would appropriate $1,301 million for Planetary Science programs, $20 million above the President’s FY 2015 base budget request. The Committee Report notes that the Committee, “with the exception of increased funding for Mars Exploration and the Discovery Program,” supported the “Planetary Science at the budget request levels.”
- The Committee Report states that the “additional funds should be allocated for future Discovery lines in other missions and data analysis to initiate Phase B activities consistent with an upcoming announcement of opportunity [AO].” The Committee Report notes that the Committee is concerned by NASA’s “delays in issuing this AO and for the proposed scheduling of Discovery launches every 36 months rather than the 24-month cycle long supported by the Committee and recommended by the Planetary Science Decadal Survey ‘Visions Voyages for Planetary Sciences 2013-2022’.” Further the Committee “opposes any lengthening of the launch cycle for Discovery missions.”
- The Committee Report states that the Committee is “concerned about the dearth of opportunities for medium-sized planetary missions after fiscal year 2015.” It notes that after Juno, New Horizons missions, and OSIRIS-Rex, “NASA lacks a plan for the next set of medium class missions.” Therefore, the Committee would direct “NASA to initiate a New Frontiers announcement of opportunity as soon as practicable with the expectation of launch the next New Frontiers mission within 48 months of the award.” Further, the “fiscal year 2016 budget submission should reflect an enhanced profile to accommodate this effort.”
- The Committee Report notes that “a mission to Europa represents one of the highest large mission priorities of the Planetary Science Decadal Survey,” and “presents NASA with an opportunity to capitalize on investments it has made in producing a heavy lift launch vehicle capability.” Further, the Committee “believes that any planning for a Europa mission should seek to maximize the scientific return and utilize the capabilities of NASA’s own heavy lift launch vehicle.” Therefore, the Committee would direct NASA, “in setting the baseline Europa mission highlighted in the decadal survey, to use the Space Launch System as the launch vehicle.”
- The Committee Report states that it “does not support the budget request to cut funding for robotic rovers and in-space observatories expected to culminate in a Mars sample return, which was identified as the top priority for planetary science by the Planetary Science Decadal Survey.”

Astrophysics

About

Having measured the age of the universe, the scientific community now seeks to explore its ultimate extremes: its birth, the edges of space and time near black holes, and the mysterious dark energy filling the entire universe. Scientists have recently developed astronomical instrumentation sensitive enough to detect planets around other stars.

President’s FY 2015 Astrophysics Missions:

- $66.0 million for Astrophysics Research and Analysis;
- $38.3 million for Balloon Project;
- $86.6 million for Other Missions and Data Analysis within Astrophysics Research;
- $75.3 million for Hubble Space Telescope;

- $12.3 million for Stratopheric Observatory for Infrared Astronomy;
- $32.7 million for Other Missions and Data Analysis within Cosmic Origins;
- $108.8 million for Physics of the Cosmos;
- $47.5 million Exoplanet Exploration;
- $98.8 million for Transiting Exoplanet Survey Satellite;
- $40.9 million for Other Missions and Data Analysis within Astrophysics Explorer;

FY 2015 Congressional Action

House passed NASA Authorization Act (H.R. 4412):

- The House passed NASA Authorization Act would authorize to appropriate $668 million for Astrophysics programs in FY 2014.
- Section 312 would direct the NASA Administrator to enter into an arrangement with the National Academies to "develop a science strategy for the study and exploration of extrasolar planets, including the use of TESS, the James Webb Space Telescope, WFIRST, or any other telescope, spacecraft, or instrument as appropriate." The strategy would include: "outline key scientific questions; identify the most promising research in the field; indicate the extent to which the mission priorities in existing decadal surveys address key extrasolar planet research goals; and make recommendations with respect to optimal coordination with international partners, commercial partners, and other not-for-profit partners." Further, the NASA Administrator would be directed to "use the strategy to inform roadmaps, strategic plans, and other activities of the Administration as they relate to extrasolar planet research and exploration, and to provide a foundation for future activities and initiatives." A report on the strategy would be required to be transmitted to Congress not later than 18 months after the date of enactment of H.R. 4412.
- Section 314 would require the NASA Administrator to "ensure that the development of the Wide-Field Infrared Survey Telescope continues while the James Webb Space Telescope is completed."
- Section 315 would require the NASA Administrator to transmit a report to Congress "outlining the cost of the Administration's potential plan for developing the Wide-Field Infrared Survey Telescope as described in the most recent astronomy and astrophysics decadal survey, including an alterative plan for the Wide-Field Infrared Survey Telescope 2.4, which includes the donated 2.4-meter aperature National Reconnaissance Office telescope." Further, "due to the budget constraints on the Administration's science programs," the report would be required to include: an assessment of affordable approaches to develop the Wide-Field Infrared Survey Telescope; a comparison to the development of mission concepts that exclude the utilization of the donated asset; an assessment of how the Administration's existing science missions will be affected by the utilization of the donated asset; a description of the cost associated with storing and maintaining the donated asset."

SCSTC passed NASA Authorization Act (S. 1317):

- The Senate Commerce Committee passed NASA Authorization Act would authorize to appropriate $670 million for Astrophysics, $63 million above the President's FY 2014 base budget request.

House passed FY 2015 CJS Appropriations Bill (H.R. 4660):

- The House passed FY 2015 Commerce, Justice, and Science Appropriations bill would appropriate $680 million for Astrophysics programs, $72 million above the President's FY 2015 base budget request.
- The Committee Report notes that the recommendation would restore the $5 million "unallocated reduction proposed for the Hubble Space Telescope (HST)." Further, NASA would be directed to "accommodate the remaining proposed reduction to HST through the use of carryover balances in Fiscal Year 2015 and fully restores these funds in future years' requests."
- The Committee Report states that the Committee "does not accept NASA's request to terminate support for the Stratospheric Observatory for Infrared Astronomy (SOFIA), a project that is currently producing good science and has not been proposed for termination by NASA's internal or external scientific review boards." Therefore, the Committee recommendation would provide $70 million for SOFIA, "which should be sufficient to support the aircraft's fixed costs (flight crews, required

maintenance, etc.) as well as a base level of scientific observations." Finally, NASA would be directed to "continue seeking third-party partners whose additional funding support would restore SOFIA's budget to its full operational level."

SAC passed FY 2015 CJS Appropriations Bill (S. 2437):

- The SAC passed FY 2015 Commerce, Justice, and Science Appropriations bill would appropriate $707 million for Astrophysics programs, $100 million above the President's FY 2015 base budget request.
- The Committee Report states that the Committee "disagrees with NASA's position that a change in Hubble Space Telescope [HST] grants administration offers any significant savings over fiscal year 2014 operations." The Committee Report goes on to state that "HST's operations and grant awards, particularly in an era of fiscal constraints, should not be used as a budget gimmick to achieve artificial savings." Therefore, "in order to plan for the remaining life of HST and provide for an initial overlap with the James Webb Space Telescope through 2020," the Committee would direct NASA "to undertake a study of operations and associated budget for fiscal years 2015 through 2020." Further, the study "should consider the full range of science capabilities, operational staffing, and risk reduction to assure a scientifically productive HST program."
- The Committee Report states that the Committee "disagrees with NASA's effort to terminate the SOFIA mission and believes that such decisions for science missions should be made only after a senior review that evaluates the relative scientific benefit and return from continued investment."
- The Committee Report notes that "within the funds provided" for the Wide-Field Infrared Survey Telescope [WFIRST], the Committee would provide $56 million "for NASA to proceed with further risk reduction and detailed formulation on a science mission that meets the exoplanet and dark energy science objectives of WFIRST." The Committee Report notes that this recommendation would build upon NASA's "work with both the Hubble Space Telescope and the James Webb Space Telescope to ensure that the synergies and discoveries from those emissions enhance WFIRST's scientific objectives so that they can be achieved in a way that is both cost effective and advances the field of study in astrophysics to guarantee world class results."
- The Committee Report notes that the Committee is "aware that the Senior Review Panel for NASA's Astrophysics program deliberated after the fiscal year 2015 budget was submitted." In addition, the Committee "believes that the decision to continue supporting large-scale science missions, such as these astrophysics resources, should first be considered for their scientific merit and viability and then in the context of any fiscal constraints." Further, the Committee would direct NASA to "take into account the panel's recommendations when allocating funding for astrophysics programs in the agency's spending plan."

James Webb Space Telescope

About

The James Webb Space Telescope (JWST) is a large, space-based astronomical observatory. The mission is a logical successor to the Hubble Space Telescope, extending beyond Hubble's discoveries by looking into the infrared spectrum, where the highly red-shifted early universe must be observed, where relatively cool objects like protostars and protoplanetary disks emit infrared light strongly, and where dust obscures shorter wavelengths.

President's FY 2015 James Webb Space Telescope:

- $645.4 million for James Webb Space Telescope;

FY 2015 Congressional Action

House passed NASA Authorization Act (H.R. 4412):

- The House passed NASA Authorization Act would authorize to appropriate $628 million for JWST in FY 2014.
- Section 313 states that it "is the Sense of Congress that the James Webb Space Telescope program is significant to our understanding of the history of the universe, including galaxies, stars, and planetary

systems, and should continue to receive priority of funding in accord with the recommendation of the most recent decadal survey for Astronomy and Astrophysics of the National Academies' Space Studies Board."

SCSTC passed NASA Authorization Act (S. 1317):

- The Senate Commerce Committee passed NASA Authorization Act would authorize to appropriate $645.4 million for JWST to fully fund the President's FY 2015 base budget request.
- Section 326 states that it is the sense of Congress, with regard to JWST, that:
    - First, "the James Webb Space Telescope will significantly advance our understanding of star and planet formation, improve our knowledge of the early universe, and support U.S. leadership in astrophysics."
    - Second, "significant progress has been made with regard to overcoming the James Webb Space Telescope's technical challenges and in improving NASA management oversight."
    - Third, "the on-time and on-budget completion of the James Webb Space Telescope should remain a top NASA priority."
    - Fourth, "consistent with annual Government Accountability Office reviews of the James Webb Space Telescope program, the Administrator should continue to improve the James Webb Space Telescope's cost and schedule estimates and oversight procedures in order to enhance NASA's ability to successfully deliver the James Webb Space Telescope on time and on budget."

House passed FY 2015 CJS Appropriations Bill (H.R. 4660):

- The House passed FY 2015 Commerce, Justice, and Science Appropriations bill would appropriate $645 million for JWST to fully fund the President's FY 2015 base budget request.
- The Committee would require NASA to "provide quarterly briefings on JWST's technical status, including the achievement of program milestones, and budget and schedule performance." These briefings would "take the place of quarterly reporting that was instituted in Fiscal Year 2013."

SAC passed FY 2015 CJS Appropriations Bill (S. 2437):

- The SAC passed FY 2015 Commerce, Justice, and Science Appropriations bill would appropriate $645 million for JWST to fully fund the President's FY 2015 base budget request.
- The Committee Report notes that the "bill maintains an overall development cost ceiling for JWST at $8,000,000,000, and the Committee intends to hold NASA and its contractors to that commitment." Further, the Committee "expects to be kept fully informed on issues relating to program and risk management, achievement of cost and schedule goals, and program technical status."

Heliophysics

About

Using a fleet of sensors on various spacecraft in Earth orbit and throughout the solar system, NASA seeks to understand how and why the Sun varies, how Earth responds to the Sun, and how human activities are affected. The science of heliophysics enables the predictions necessary to safeguard life and society on Earth and outward journeys of human and robotic explorers.

President's FY 2015 Heliophysics Missions:

- $65.6 million for Sounding Rockets;
- $21.3 million for Research Range;
- $33.9 million for Heliophysics Research and Analysis;
- $96.7 million for Other Missions and Data Analysis within Heliophysics Research;
- $145.6 million for Solar Probe Plus;
- $76.5 million for Solar Orbiter Collaboration;
- $44.3 million for Other Missions and Data Analysis within Living with a Star;
- $39.5 million for Magnetospheric Multiscale;
- $21.9 million Other Missions and Data Analysis within Solar Terrestrial Probes;

- $78.2 million for ICON;
- $45.4 million for Other Missions and Data Analysis within Heliophysics Explorer Program;

FY 2015 Congressional Action

House passed NASA Authorization Act (H.R. 4412):

- The House passed NASA Authorization Act would authorize to appropriate $654 million for Heliophysics programs in FY 2014.
- Section 332 would require the Director of the Office of Science and Technology Policy, with cooperation from the NASA Administrator, the Administrator of NOAA, the Director of the National Science Foundation, the Secretary of Defense, the Secretary of Energy, and the Secretary of Homeland Security, to "enter into an arrangement with the National Academies to provide a comprehensive study that reviews current and planned space weather monitoring requirements and capabilities." The study would be required to "inform the process of identifying national needs for future space weather monitoring and mitigation." In addition, the National Academies would be required to "give consideration to international and private sector efforts and collaboration." Finally, the study would "review the current state of research capabilities in observing, modeling, and prediction and provide recommendations to ensure future advancement of predictive capability."
- Section 333 would prohibit the NASA Administrator from integrating or funding "the development of any sensor on the Deep Space Climate Observatory (DSCOVR) that is not aligned with the spacecraft's original space weather mission requirements." In addition, the NASA Administrator would be prohibited from developing or implementing "algorithms, or any other application or products that are not aligned with the Deep Space Climate Observatory mission's intended space weather requirements, or to enable 'Earth to noon' images from the spacecraft."

SCSTC passed NASA Authorization Act (S. 1317):

- The Senate Commerce Committee passed NASA Authorization Act would authorize to appropriate $633 million for Heliophysics, $35.9 million below the President's FY 2015 base budget request.
- Section 301 would direct the NASA Administrator to "continue to develop and integrate the National Institute of Standards and Technology Advanced Radiometer, the Earth Polychromatic Imaging Camera, and related hardware and software on the Deep Space Climate Observatory."

House passed FY 2015 CJS Appropriations Bill (H.R. 4660):

- The House passed FY 2015 Commerce, Justice, and Science Appropriations bill would appropriate $668 million for Heliophysics programs to fully fund the President's FY 2015 base budget request.
- The Committee Report states that the Committee "is concerned that the Heliophysics Explorer program is not receiving the same level of support from NASA as comparable Astrophysics program and will not achieve the mission cadence recommended for Heliophysics by the scientific community." Therefore, the Committee would urge NASA to "rectify this issue by accelerating funding for Heliophysics Explorer Future Missions from Fiscal Year 2017 into Fiscal Year 2016."

SAC passed FY 2015 CJS Appropriations Bill (S. 2437):

- The SAC passed FY 2015 Commerce, Justice, and Science Appropriations bill would appropriate $671 million for Heliophysics programs, $2 million above the President's FY 2015 base budget request.
- The Committee would direct NASA to "implement the multiagency 'Diversify, Realize, Integrate, Venture, and Educate' [DRIVE] initiative as recommended in the Heliophysics Decadal Survey in order to take advantage of new opportunities yielded by the Heliophysics Systems Observatory assets and data."
- The Committee Report notes that the Committee "strongly affirms its multiyear commitment to a 2018 launch for the solar probe plus mission as advanced technology development funds provided to NASA in prior years have retired substantial technical risk and made the funding profile for the mission manageable, points independently verified by outside reviews." Further, the Committee "fully expects that all future NASA budget submissions will adhere to a funding profile that guarantees a 2018 launch."
- Finally the Committee believes that the Heliophysics Explorer Program "and other programs of opportunity are crucial to a robust space science program, and that each Explorer selection round

should be adequately funded to guarantee one full mission for astrophysics and a corresponding one for heliophysics." The Committee Report notes that the Committee will "monitor this activity carefully since this program is one of NASA's longest running most successful programs, and more than 90 explorer missions have launched, including Explorer 1, which discovered the Earth's radiation belts, and the Nobel Prize-enabling Cosmic Background Explorer mission."

Exploration

Budget Authority, $ in millions	Consolidated Approps, 2014 (P.L. 113-76)	President's FY 2015 NASA Budget Request	President's FY 2015 NASA Opportunity, Growth, and Security Initiative	House passed NASA Auth FY 2014 (H.R. 4412)	SCSTC Passed NASA Auth FY 2015 (S. 1317)	House passed FY 2015 CJS Approps Act (H.R. 4660)	SAC passed FY 2015 CJS Approps Act (S. 2437)
Exploration Research and Development	302.0	343.0	0.0	302.0	332.0	327.0	311.4
Commercial Crew	696.0	848.0	250.0	696.0	815.0	785.0	805.0
Orion Multipurpose Crew Vehicle(s)	1,197.0	1,052.8	100.0	1,197.0	1,225.0	1,140.0	1,200.0
Space Launch System	1,600.0	1,380.3		1,600.0	1,725.0	1,600.0	1,700.0
Exploration Ground Systems	318.2	351.3	0.0	318.2	425.0	315.00	351.3
Total	**4,113.2**	**3,976.0**	**350.0**	**4,113.2**	**4,552.0**	**4,167.0**	**4,367.7**

President's FY 2015 Budget Request for Overall Exploration Portfolio

In FY 2015 the President base budget requested $3,976 million for Exploration missions, $137 million below the funds appropriated for Exploration missions in FY 2014. However, the President requested an additional $35-million for Exploration missions in his Opportunity, Growth, and Security Initiative. The additional requested funds are as follows:

- $250.0 million for Commercial Crew;
- $100.0 million for Orion and Space Launch System;

Space Launch System

About

The NASA Authorization Act of 2010 directed NASA to develop an evolvable heavy-lift rocket that will allow human exploration beyond low Earth orbit. NASA FY 2014 budget justification documents note that "through its lifetime, SLS capability will evolve using a block upgrade approach, driven by mission requirements." The SLS will evolve through three stages:

- First, "SLS will achieve a 70-metric ton Block1 capability that will enable early system demonstrations such as test flights near the Moon."
- Second, the "follow-on Block 1A upgrade will use advanced boosters to improve vehicle performance to 105 metric tons, significant expanding deep space mission capability."
- Third, the Block 2 upgrade will add "an advanced upperstage, enabling performance up to 130 metric tons."

In addition, NASA's FY 2014 budget justification documents note that "SLS is also partnering with the US Air Force to pursue areas of common interest that may be applicable to future SLS block upgrades."

FY 2015 Congressional Action

House passed NASA Authorization Act (H.R. 4412):

- The House passed NASA Authorization Act would authorize $1,600 million for the SLS launch vehicle in FY 2014.
- Section 203 states that Congress finds that:

    - First, “the Space Launch System is the most practical approach to reaching the Moon, Mars, and beyond, and Congress reaffirms the policy and minimum capability requirements contained in section 302 of the National Aeronautics and Space Administration Authorization Act of 2010.”
    - Second, “the primary goal for the design of the fully integrated Space Launch System is to safely carry a total payload of 130 tons or more to low-Earth orbit to enable human space exploration of the Moon, Mars, and beyond over the course of the next century ” as required by the NASA Authorization Act of 2010.
    - Third, “the uncrewed flight test of the 70-ton core element of the Space Launch System fully integrated with the Orion crew capsule,” as described in the NASA Authorization Act of 2010, is “a necessary flight demonstration in an overall program plan, subject to appropriations.”
    - Fourth, “the schedule of the 70-ton core element crewed flight demonstration in 2021 with the Space Launch System fully integrated with the Orion crew capsule,” as described in the NASA Authorization Act of 2010, “is subject to appropriations.”
- Section 203 would also direct the NASA Administrator, using the President’s budget request for fiscal year 2014 and notional numbers requested therein as a baseline, provide to Congress, not later than 90 days after the date of enactment of this bill, an estimate that includes:
    - First, “when the 70-ton core element of the Space Launch System fully integrated with the Orion crew capsule may be demonstrated as an operational capability.”
    - Second, “when the 130-ton Space Launch System fully integrated with Orion crew capsule may be demonstrated as an operational capability.”
    - Third, “the projected annual operational costs through 2030 for the 130-ton Space Launch System fully integrated with the Orion crew capsule after its operational capability has been demonstrated.”
    - Fourth, “the projected flight rate for the 130-ton Space Launch System fully integrated with the Orion crew capsule through 2030.”
    - Further, “if the Administrator determines that the uncrewed test flight of the 70-ton core element of the Space Launch System fully integrated with the Orion crew capsule will not occur on or before December 31, 2017, or that the crewed test flight of the 70-ton core element of the Space Launch System fully integrated with the Orion crew capsule will not occur on or before December 31, 2021,” the progress report would be required to include “an estimate of additional funds required through annual appropriations for fiscal year 2015 through 2021 which may be necessary to meet such goals in those years.”
- In addition, Section 203 would require the Administrator of NASA, working with the Secretary of Defense and the Director of National Intelligence, to transmit a report to Congress “that addresses the effort and budget required to enable and utilize a cargo variant of the 130-ton Space Launch System configuration.” Further, this report would be required to “include consideration of the technical requirements of the scientific and national security communities related to such Space Launch System and shall directly assess the utility and estimated cost savings obtained by using such Space Launch System for national security and space science missions.” The report would be required to be transmitted to Congress not later than 180 days after the date of enactment of the bill.
- Finally, Section 203 would require the Administrator to “conduct a well-publicized competition among students in elementary and secondary schools to name the elements of the Administration’s exploration program,” to include:
    - First, “a name for the deep space human exploration program as a whole, which includes the Space Launch System, the Orion crew capsule, lunar landers, and future missions.”
    - Second, “a name for the Space Launch System.”
- Section 205 would require the Associate Administrator of NASA, not later than 90 days after the date of enactment of this bill, to provide to Congress a report that:
    - First, “describes the estimated total development cost of an advanced booster for the Space Launch System.”

    - Second, “details any reductions or increases to the development cost of the Space Launch System which may result from conducting a competition for an advanced booster.”
    - Third, “outlines any potential schedule delay to the Space Launch System 2017 EM-1 launch as a result of increased costs associated with conducting a competition for an advanced booster.”
    - Further, if the Associate Administrator reports reductions to the development cost of the SLS, and no adverse schedule impact, as a result of conducting a competition for an advanced booster, then NASA would be required to “conduct a full and open competition for an advanced booster for the Space Launch System to meet the requirements” described in section 302 of the NASA Authorization Act of 2010 “to begin not later than 1 year after the Associate Administrator transmits the report required” in section 205.
- Section 702 of the bill would make the following Congressional findings with regard to SLS termination liability:
    - First, “the International Space Station, the Space Launch System, and the Orion crew capsule will enable the Nation to continue operations in low-Earth orbit and to send its astronauts to deep space. The James Webb Space Telescope will revolutionize our understanding of star and planet formation and how galaxies evolved and advance the search for the origins of our universe. As a result of their unique capabilities and their critical contribution to the future of space exploration, these systems have been designated by the Congress and the Administration as priority investments.”
    - Second, “while the Space Launch System and the Orion programs, currently under development, have made significant progress, they have not been funded at levels authorized, and as a result congressionally authorized milestones will be delayed by several years.”
    - Third, “although the James Webb Space Telescope is making steady progress towards its scheduled 2018 launch, it confronts a number of challenging integration tests that will stress a congressionally imposed development cost cap.”
    - Fourth, “contractors are currently holding program funding, estimated to be in the hundreds of millions of dollars, to cover the potential termination liability should the Government choose to terminate a program for convenience. As a result, hundreds of millions of taxpayer dollars are unavailable for meaningful work on these programs”
    - Fifth, “according to the Government Accountability Office, the National Aeronautics and Space Administration procures most of its goods and services through contracts, and it terminates very few of them. In fiscal year 2010, the agency terminated 28 of 16,343 active contracts and orders—a termination rate of about 0.17 percent.”
    - Sixth, “providing processes requiring Congressional action on termination of these high-priority programs would enable contractors to apply taxpayer dollars to making maximum progress in meeting the established technical goals and schedule milestones of these programs.”
- Therefore, Section 702 of the bill would provide termination liability guidelines, “for a covered program,” which is defined as the International Space Station, the Space Launch System, and the Orion crew capsule, and the James Webb Space Telescope. Those guidelines would include:
    - First, “termination liability costs for a covered program” would “be provided only pursuant to this subsection.”
    - Second, the NASA Administrator would be prohibited from reserving “funds from amounts appropriated for a covered program, or require the reservation of funds by the prime contractor, for potential termination liability costs with respect to a covered program.”
    - Third, “it is the intent of Congress that funds authorized be appropriated for covered programs be applied in meeting established technical goals and schedule milestones.”
    - Fourth, “funds that have been reserved before the date of enactment of this Act for potential termination liability shall be promptly used to make maximum progress in meeting the established goals and milestones of the covered program.”

    - Fifth, the NASA Administrator would be required to "notify the Committee on Science, Space, and Technology of the House of Representatives and the Commerce, Science, and Transportation of the Senate not later than 120 days in advance of initiating termination for convenience or termination for cause of a prime contract on a covered program."
    - Sixth, "if the Administrator initiates termination of a prime contract on a covered program, and sufficient unobligated appropriations are not available to cover termination liability costs in the appropriations account that is funding the prime contract being terminated, the Administrator shall provide to Congress a notification that an authorization of an appropriation is necessary no later than 120 days in advance of the proposed contract termination settlement for the covered program." In addition, it would be "the intent of Congress to provide such additional authorization for appropriations as may be necessary to pay termination liability costs on prime contracts for covered programs if Congress deems it appropriate that the Administration terminate such prime contracts." In addition, the Administration would "be responsible for applying these additional funds for payment of all allowable and reasonable negotiated termination liability costs if the Administration terminates a prime contract for a covered program. If the Administration terminates a prime contract for a covered program for the convenience of the Federal Government, then the Federal Government is responsible for payment of all allowable and reasonable negotiated termination liability costs on the prime contract."
- In addition, Section 702 of the bill would require the NASA Administrator to transmit to Congress, not later than 6 months after the date of enactment of the bill, and every 6 months thereafter for the duration of the prime contacts on covered programs, a report that includes: "the estimated termination liability costs for each of the prime contracts; and the basis for how such estimate was determined."

<u>SCSTC passed NASA Authorization Act (S. 1317):</u>

- The Senate Commerce Committee passed NASA Authorization Act would authorize $1,725 million for SLS in FY 2014, $344 million above the President's FY 2015 base budget request.
- Section 203 states that "Congress finds that education and outreach to encourage the next generation of scientists and engineers to become involved in science and space exploration is one of the Administration's most important missions." Therefore, the NASA Administrator would be required to provide to Congress, not later than 30 days after the date of enactment of S. 1317, "a plan to engage the public, including science students in elementary and secondary education programs, throughout the United States in naming: NASA's overall deep space human exploration program; and the Space Launch System."
- Section 233 states that it is a sense of Congress that:
    - First, "while NASA's rate of contract termination is relatively low, the proper management of termination liability is essential to minimizing the government's cost risk and to ensuring that taxpayer funding properly supports meeting NASA contract performance goals."
    - Second, "maintaining the Administration's flexibility in executing termination liability provisions helps NASA to effectively manage its cost risks, given the circumstances relevant to individual contracts."
    - Third, "current statute provides the Administration with broad leeway in determining the amount of and managing its termination liability reserves."
    - Fourth, "the concerns noted in 2011 by the Comptroller General, who found that NASA had not successfully monitored potential termination liability costs or enforced related procedures, must be addressed in order to ensure the best use of taxpayer funds."
- Therefore, section 233 would direct the NASA Administrator to provide to Congress review report on NASA's "current termination liability practices and the benefits of potential alternatives." The report would be required to include:
    - First, "an accounting of the total budget currently held in reserve, by either the Administration or a contractor, to cover termination liability for the Space Launch System and Orion programs."

- Second, "an accounting of the current cost risk of termination liability for the Space Launch System and Orion programs."
- Third, "a description of the guidelines by which the Administration determines the appropriate level of termination liability and monitors potential termination liability costs over the lifetime of a contract."
- Fourth, "a descriptive list of alternative frameworks for managing termination liability, including frameworks wherein neither NASA nor the contractor holds funds in reserve to cover termination liability."
- Fifth, "a comparison demonstrating the benefits and drawbacks of the current and alternative termination liability frameworks."
- Sixth, "a description of any statutory changes that may be required to implement alternative termination liability frameworks, which may include permitting the Administration to pool reserves across programs or to apply current year appropriations towards liability payments."

- In addition, the NASA Administrator would be required to provide the Comptroller General with a copy of the report for review, which, not later than 30 after the date that NASA receives the report, the Comptroller General would be required to deliver to Congress "an assessment of the potential for continued improvement relative to the previous GAO review of NASA termination liability, conducted in 2011."

<u>House passed FY 2015 CJS Appropriations Bill (H.R. 4660):</u>

- The House passed FY 2015 Commerce, Justice, and Science Appropriations bill would appropriate $1,600 million for the Space Launch System (SLS) in FY 2015, $220 million above the President's FY 2015 base budget request.
- The Committee Report states the Committee "has repeatedly expressed frustration with NASA's practices of requesting arbitrarily reduced funding levels for SLS and insisting that the program manage to an inefficient flat-line budget profile." The Committee Report notes that the "detrimental results of these practices are evident in the fiscal year 2015 request, which acknowledges that reduced SLS funding levels will lead to a launch delay for Exploration Mission-1 (EM-1) while also requiring the deferral of long-lead work needed for the timely achievement of EM-2 and other future flights."
- In addition, "knowing that NASA's requests for the program have unacceptable consequences, the Committee has previously looked to the SLS Independent Cost Assessment (ICA) for an objective and realistic benchmark for SLS funding needs." With that said, the utility of the ICA "has decreased each year as its estimates age," which is why the Committee "has long anticipated the completion of a confirmed budget baseline to provide a stable, more up-to-date program plan to guide future appropriations." Unfortunately, the "baseline being prepared by NASA suffers from the same problems as the annual budget request: it assumes a fixed, artificially low Fiscal Year 2015 level; imposes a flat profile on outyear estimates; and fails to adequately capture needs for activities in support of SLS beyond EM-1." Therefore, the Committee "has chosen to maintain SLS vehicle development funding at the Fiscal Year 2014 enacted level."
- The Committee Report notes that the Committee "continues to urge NASA to allocate funds to elements like Advanced Booster Engineering Development and Risk Reduction, engine development and/or upper stage development, all of which are required for the program to progress beyond the initial SLS configuration." Therefore, the Committee would direct "that, to the maximum extent possible, NASA should ensure that all vehicle development funding leverages existing investments; promotes efficiency through commonality of design and simultaneous development; and minimizes the need for redesigns or other costly changes affecting future SLS vehicle configuration."
- Finally, to "give the Committee more insight into the level of effort being dedicated to each component of the SLS," NASA would be required to "continue submitting quarterly reports on SLS spending by major program element, as first required in the statement accompanying Public Law 112-55." Further, the Committee would anticipate "the submission of NASA's report on other potential uses of the 130 metric ton SLS configuration, as directed in fiscal year 2014." The Committee Report notes that the Committee

"hopes that the range of such possible uses will enable a substantially better SLS launch tempo than currently projected by NASA."

SAC passed FY 2015 CJS Appropriations Bill (S. 2437):

- The SAC passed FY 2015 Commerce, Justice, and Science Appropriations bill would appropriate $1,700 million for the Space Launch System (SLS) in FY 2015 to "keep the program on a path toward successfully meeting its launch milestones," $320 million above the President's FY 2015 base budget request.
- The Committee Report states that "the goal of our human space program has always been to explore beyond our own planet." The Committee Report notes that in order to "attain NASA's goal, proper resources are essential to ensure that the development of SLS and Orion MPCV will be successful." However, "the requested funding levels for these vehicles have again fallen below what is necessary," and, "in fact, since the inception of the program, the Committee has repeatedly included the funding necessary to keep these programs on schedule and on budget because the budget request itself has fallen far short of requirements by providing unreliable and unsubstantiated cost estimates." Again, the Committee "remains disappointed that the funding requested by NASA for SLS and Orion MPCV once again bears little relation to either funding levels provided in previous years or NASA's own cost estimates and policies." In addition, "NASA has yet to provide independent cost and schedule assessments for SLS and Orion MPCV, which the Committee has requested since the programs began." Therefore, "to preserve the current schedule and maintain proper funding for planned work and serve levels, the Committee must rectify NASA's planned budget shortfall for SLS and Orion MPCV."
- The Committee Report notes that the "proposed funding for SLS, by NASA's own cost and schedule standards, is not sufficient to deliver an initial test launch by the planned December 2017 date." Further, "insufficient funding for SLS will lead to cost escalation and unnecessary schedule delays that will have to be addressed in future budget years."
- The Committee Report notes that "in response to longstanding issues with cost overruns and schedule delays in NASA missions, NASA issued NASA Procedural Requirements [NPR] 7120.5E which instituted the joint cost and schedule confidence level [JCL] process." The Committee Report notes important details about the JCL:
    - First, it "is intended to assess potential risk and cost of a mission and consequently determine the likelihood of completing all remaining work at or below the budgeted levels on or before the mission's planned completion date."
    - Second, "the standard JCL that NASA requires is 70 percent meaning the mission has a 70 percent chance of meeting budget and schedule targets."
    - Third, the Government Accountability Office (GAO) "in its annual assessment of NASA's large-scale projects, has indicated that the JCL process helps ensure estimates are more realistic," and that "the JCL process 'has likely contributed to the recent decrease in cost and schedule growth in [NASA's] portfolio compared to historical levels.'"
- The Committee Report goes on to note that during the course of its annual budget hearings, "NASA testified that SLS did not need a JCL of 70 percent, as specified in NPR 7120.5E, yet NASA has not provided any documentation to substantiate this claim." The Committee Report states that "a budget proposal resulting in a low JCL ties NASA's hands by limiting its ability to mitigate technical risks, control program costs growth, and minimize schedule delays," which is "contrary to the stated purpose of NPR 7120.5E." Therefore, "to ensure that NASA follows its own guidance and does not require SLS and Orion MPCV to incur a higher risk profile than other major missions," S. 2437 would direct NASA to:
    - First, "provide for the Space Launch System and Orion Multi-Purpose Crew Vehicle, concurrent with the annual budget submission, 5 year budget profiles and projections that adhere to the 70 percent Joint Confidence Level [JCL]."
    - Second, "any JCL approved by the NASA Administrator that is less than 70 percent for the Space Launch System and Orion Multi-Purpose Crew Vehicle shall be justified and documented, and that the NASA Administrator shall still provide concurrently with the annual budget submission the full cost estimates for both programs to achieve a 70 percent JCL."

- Third, “in no case shall the JCL of the Space Launch System or the Orion Multi-Purpose Crew Vehicle be less than the guidance outlined in NASA Procedural Requirements 7120.5E.”

Orion Multi-Purpose Crew Vehicle

About

NASA’s FY 2014 budget justification documents states that Orion MPCV will be capable of carrying “a crew of four astronauts beyond Earth orbit for 21 days, or longer if paired with a potential future deep-space habitat.” The spacecraft has three components, which include a crew module, service module, and launch abort system, with a separate adapter to connect the crew and launch vehicles.

- The crew module is described as a “familiar capsule shape on the outside, but inside it contains advanced, state-of-the-art in crew systems.” During a mission the Orion MPCV will house “the crew, providing a safe environment within which to live and work.” In addition, “Its advanced heat shield protects the crew from the reentry heating of a high-speed return from beyond Earth orbit.”
- The service module “is comprised of a crew module adapter and an ESA-developed service module that together provide in-space services to the crew module, including power, propulsion, and other life support systems.”
- The launch abort system sits “a tower atop the crew module,” which “in the event of an emergency during launch or climb to orbit, will activate within milliseconds to propel the crew module to safety.” Further, the launch abort system “protects the crew module from dangerous atmospheric loads and heating, then is jettisoned once the Orion MPCV is out of the atmosphere and safely on its way to orbit.”

FY 2015 Congressional Action

House passed NASA Authorization Act (H.R. 4412):

- The House passed NASA Authorization Act would authorize $1,200 million for the Orion in FY 2014. Section 204 of the bill states that the “Orion crew capsule shall meet the practical needs and the minimum capability requirements described in section 303 of the NASA Authorization Act of 2010.”
- Section 204 of the bill would require the NASA Administrator to provide a report to Congress on Orion, including:
  - First, “detailing those components and systems of the Orion crew capsule that ensure it is in compliance with section 303(b) of such Act.”
  - Second, “detailing the expected date that the Orion crew capsule will be available to transport crew and cargo to the International Space Station.”
  - Third, “certifying that the requirements of section 303(b)(3) of such Act will be met by the Administration in time for the first crewed test flight in 2021.”

SCSTC passed NASA Authorization Act (S. 1317):

- The Senate Commerce Committee passed NASA Authorization Act would authorize $1,225 million for Orion in FY 2015, $167 million above the President’s FY 2015 base budget request.

House passed FY 2015 CJS Appropriations Bill (H.R. 4660):

- The House passed FY 2015 Commerce, Justice, and Science Appropriations bill would appropriate $1,140 million for the Orion MPCV in FY 2015, $88 million above the President’s FY 2015 base budget request.
- The Committee Report states that the Committee recommended funding level would “keep the vehicle on track for the Exploration Flight Test-1 later this year, as well as the first test flight integrated with SLS in 2017 and the first crewed test flight in 2021.”

SAC passed FY 2015 CJS Appropriations Bill (S. 2437):

- The SAC passed FY 2015 Commerce, Justice, and Science Appropriations bill would appropriate $1,200 million for Orion in FY 2015 to “maintain the consistent progress this program has achieved, including a path to achieve Exploration Mission-1, scheduled for 2017;” $148 million above the President’s FY 2015 base budget request.
- The Committee Report states that “the goal of our human space program has always been to explore beyond our own planet.” The Committee Report notes that in order to “attain NASA’s goal, proper resources are essential to ensure that the development of SLS and Orion MPCV will be successful.”

However, “the requested funding levels for these vehicles have again fallen below what is necessary,” and, “in fact, since the inception of the program, the Committee has repeatedly included the funding necessary to keep these programs on schedule and on budget because the budget request itself has fallen far short of requirements by providing unreliable and unsubstantiated cost estimates.” Again, the Committee “remains disappointed that the funding requested by NASA for SLS and Orion MPCV once again bears little relation to either funding levels provided in previous years or NASA’s own cost estimates and policies.” In addition, “NASA has yet to provide independent cost and schedule assessments for SLS and Orion MPCV, which the Committee has requested since the programs began.” Therefore, “to preserve the current schedule and maintain proper funding for planned work and serve levels, the Committee must rectify NASA’s planned budget shortfall for SLS and Orion MPCV.”

- The Committee Report notes that the “proposed funding for SLS, by NASA’s own cost and schedule standards, is not sufficient to deliver an initial test launch by the planned December 2017 date.” Further, “insufficient funding for SLS will lead to cost escalation and unnecessary schedule delays that will have to be addressed in future budget years.”
- The Committee Report notes that “in response to longstanding issues with cost overruns and schedule delays in NASA missions, NASA issued NASA Procedural Requirements [NPR] 7120.5E which instituted the joint cost and schedule confidence level [JCL] process.” The Committee Report notes important details about the JCL:
    - First, it “is intended to assess potential risk and cost of a mission and consequently determine the likelihood of completing all remaining work at or below the budgeted levels on or before the mission’s planned completion date.”
    - Second, “the standard JCL that NASA requires is 70 percent meaning the mission has a 70 percent chance of meeting budget and schedule targets.”
    - Third, the Government Accountability Office (GAO) “in its annual assessment of NASA’s large-scale projects, has indicated that the JCL process helps ensure estimates are more realistic,” and that “the JCL process ‘has likely contributed to the recent decrease in cost and schedule growth in [NASA’s] portfolio compared to historical levels.’”
- The Committee Report goes on to note that during the course of its annual budget hearings, “NASA testified that SLS did not need a JCL of 70 percent, as specified in NPR 7120.5E, yet NASA has not provided any documentation to substantiate this claim.” The Committee Report states that “a budget proposal resulting in a low JCL ties NASA’s hands by limiting its ability to mitigate technical risks, control program costs growth, and minimize schedule delays,” which is “contrary to the stated purpose of NPR 7120.5E.” Therefore, “to ensure that NASA follows its own guidance and does not require SLS and Orion MPCV to incur a higher risk profile than other major missions,” S. 2437 would direct NASA to:
    - First, “provide for the Space Launch System and Orion Multi-Purpose Crew Vehicle, concurrent with the annual budget submission, 5 year budget profiles and projections that adhere to the 70 percent Joint Confidence Level [JCL].”
    - Second, “any JCL approved by the NASA Administrator that is less than 70 percent for the Space Launch System and Orion Multi-Purpose Crew Vehicle shall be justified and documented, and that the NASA Administrator shall still provide concurrently with the annual budget submission the full cost estimates for both programs to achieve a 70 percent JCL.”
    - Third, “in no case shall the JCL of the Space Launch System or the Orion Multi-Purpose Crew Vehicle be less than the guidance outlined in NASA Procedural Requirements 7120.5E.”

Commercial Crew

About

With an eye to the future of human spaceflight, NASA is looking to the U.S. private sector to develop and operate safe, reliable, and affordable crew transportation to low Earth orbit, including to the International Space Station (ISS).

FY 2015 Congressional Action

House passed NASA Authorization Act (H.R. 4412):

- The House passed NASA Authorization Act would authorize $696 million for Commercial Crew in FY 2014.
- Section 213 of the bill would direct the NASA Administrator to "consider the ramifications of and create contingencies as the sequestration adopted in the Budget Control Act of 2011 (Public Law 112-25) continues to reduce the Administration's overall budget."
- To this end, Section 213 of the bill would require the NASA Administrator to provide a report to Congress, within 60 days after the enactment of the bill, "containing 5 distinct options for the final stages of the commercial crew program." The report would be required to include:
    - First, "a strategy that assumes an appropriation of $500,000,000 over the next 3 fiscal years."
    - Second, "a strategy that assumes an appropriation of $600,000,000 over the next 3 fiscal years."
    - Third, "a strategy that assumes an appropriation of $700,000,000 over the next 3 fiscal years."
    - Fourth, "a strategy that assumes an appropriation of $800,000,000 over the next 3 fiscal years."
    - Fifth, "a strategy that has yet to be considered previously in any budget submission but that the Administration believes could ensure the flight readiness date of 2017 for at least over provider or significantly decreases the overall program life cycle cost."
- In addition, each strategy would be required to "include the contracting instruments the Administration will employ to acquire the services in each phase of development or acquisition, the number of commercial providers the Administration will include in the program, and the estimated flight readiness date in each scenario."
- Section 214 of the bill would require NASA to "carry out its flight readiness demonstration, in which one or more commercial crew partner companies safely transports United States astronauts to the International Space Station, by December 31, 2017." The report would be required to be transmitted to Congress not later than 180 days after the date of enactment of the bill and every 90 days thereafter until NASA meets the flight readiness demonstration. Further, the report would be required to include:
    - First, a description of the "current status of the Commercial Crew program, including all funding paid to any partner company throughout the life of the program detailed by specific dollar amounts provided for each milestone completed for each partner company."
    - Second, "specifying the accomplishments and milestones completed in the 90 days prior to the date of transmission of the report under any phase of the program and all dollar amounts provided for each of those milestones."
    - Third, "identifying those accomplishments and milestones that were expected to be completed in the 90 days prior to the date of transmission of such report under any phase of the program but that were not completed in that timeframe."
    - Fourth, "setting forth the accomplishments and milestones that are expected to be completed in the 90 day period following the transmission of such report under any phase of the program."
    - Fifth, "containing a statement of flight readiness." The statement of flight readiness would be required to include either: "A certification by the Administrator that the Administration is on schedule to comply" with the flight readiness demonstration; "or an explanation as to why the Administration is not on schedule to comply" with the flight readiness demonstration and "why the Administration did not develop an acquisition strategy based on existing budget authority." And, "a certification by the Administrator that all deviations from the Aerospace Safety Advisory Panel recommendations have been reported in accordance with section 215."
- In addition, not later than 60 days after the issuance of the explanation, the NASA Administrator would be required to "provide, and begin implementation of, a new acquisition strategy that ensures that at least 1 company will be prepared to provide crew transport services by the flight readiness demonstration deadline."

- Section 215 would reaffirm "the importance of the Aerospace Safety Advisory Panel [ASAP] in providing advice to the Administrator and Congress" in accordance with its duties. In addition, Section 215 would require several reports related to the ASAP.
    - First, it would require the NASA Administrator to report to Congress, not later than 30 days after the date of enactment of H.R. 4412, "on the extent to which the Administration has followed, intends to follow, or does not intend to follow the advice of the 2012 Annual Report of the Aerospace Safety Advisory Panel."
    - Second, it would require the ASAP to submit an annual report to the NASA Administrator and Congress "an evaluation of the Administration's management and culture related to safety," as well as "an evaluation of the extent to which the Administration follows the Panel's advice."
    - Third, it would require the NASA Administrator to report to Congress, not later than 30 days after each annual report by the ASAP is completed, "on the extent to which the Administration has followed, intends to follow, or does not intend to follow the Panel's advice."
- Section 703 of the bill would extend indemnification by 5 years, from December 31, 2013 to December 31, 2018.
- Section 707 of the bill outlines additional guidance for Space Act Agreements:
    - First, "to the extent that the Administrator determines practicable, the funds provided by the Government under a Space Act Agreement shall not exceed the total amount provided by other parties to the Space Act Agreement."
    - Second, "a Space Act Agreement may be used only when the use of a standard contract, grant, or cooperative agreement is not feasible or appropriate, as determined by the Associate Administrator for Procurement."
    - Third, the NASA Administrator would be required to "make available for public notice and comment each proposed Space Act Agreement at least 30 days before entering into such agreement, with appropriate redactions for proprietary, sensitive, or classified information."
    - Fourth, the NASA Administrator would be required to publically disclose on the Administration's website and make available in a searchable format all Space Act Agreements, with appropriate redactions for proprietary, sensitive, or classified information, in a timely manner."
    - Fifth, the NASA Administrator would be prohibited from entering "into a funded Space Act Agreement for an amount in excess of $50,000,000 unless such agreement has been specifically authorized by law."
- In addition, the NASA Administrator would be required to provide Congress, not later than 90 days after the end of each fiscal year, a report "on the use of Space Act Agreement authority by the Administration during the previous fiscal year." This report would be required to include:
    - First, "an indication of whether the agreement is a reimbursable, nonreimbursable, or funded Space Act Agreement."
    - Second, "a description of: the subject of terms; the parties; the responsible mission directorate, center, or headquarters element; the value; the extent of the cost sharing among Federal Government and non-Federal sources; the time period or schedule; and all milestones."
    - Third, "an indication of whether the agreement was renewed during the previous fiscal year."
    - Fourth, "a list of all anticipated reimbursable, nonreimbursable, and funded Space Act Agreements for the upcoming fiscal year."
    - Fifth, "a summary of: the technology areas in which research projects were conducted under such agreements; the extent to which the use of the Space Agreements has contributed to a broadening of the technology and industrial base available for meeting Administration needs; has fostered within the technology and industrial base new relationships and practices that support the United States; and the total amount of value received by the Federal Government during the fiscal year pursuant to such Space Act Agreements."

<u>SCSTC passed NASA Authorization Act (S. 1317):</u>

- The Senate Commerce Committee passed NASA Authorization Act would authorize $815 million for Commercial Crew in FY 2015, $32 million below the President's FY 2015 base budget request.
- Section 224 states that Congress finds that:
    - First, "NASA's Commercial Orbital Transportation Services, Cargo Resupply Services, and Commercial Crew Program demonstrate the potential for procuring routine, commercially provided access to the ISS and to low-Earth orbit using innovative and cost-effective development procurement strategies."
    - Second, "Federal investments in the U.S. private space industry have the ability to provide for lower cost access to space for researchers and for commercial ventures."
    - Third, "commercially provided space transportation is critical to maximizing utilization of the ISS."
    - Fourth, "encouraging competition among launch service providers and maintaining multiple space transportation options helps to reduce long-term costs to the Federal Government and to induce continual improvement in available private-sector services."
    - Fifth, "maintaining multiple launch service providers helps ensure uninterrupted access to the space environment should a particular provider's services become unavailable."
- Section 224 also provides a sense of Congress that NASA:
    - First, "should continue to support the development of safe, reliable, and cost effective commercial launch capabilities for the primary purpose of securing domestic access to the ISS as quickly and safely as possible."
    - Second, "should encourage a viable commercial market for the capabilities."
- Section 224 would make it "the policy of the United States that, to foster the competitive development, operation, and improvement of private space transportation services, services for Federal Government access to and return from the ISS, whenever feasible, shall be procured via fair and open competition for well-defined, milestone-based, Federal Acquisition Regulation-based contracts."
- With regard to "evaluating commercial space transportation service providers," Section 224 would require the NASA Administrator to:
    - First, "aim to minimize the life-cycle costs of obtaining transportation services."
    - Second, "assure compliance with all safety and mission assurance requirements."
    - Third, "consider contractor financial investment into the development of transportation capabilities."
    - Fourth, with regard to commercial crew transport services: "consider flexibility in design, including sample return capabilities;" and "provide a written notification and justification to the appropriate committees of Congress if the price per seat exceeds the cost negotiated by NASA for crew transport in April 2013."
    - Fifth, "in implementing the policy" for commercial crew, the NASA Administrator would be required to provide Congress, not later than 120 days after the date of enactment of S. 1317, "a strategy for transitioning from Space Act Agreements to Federal Acquisition Regulation-based contracts for the procurement of crew transportation services to and from the ISS." The strategy would be required to include:
        - "A comparison of potential procurement strategies based on: maximizing safety and mission assurance; the total projected costs tot eh Federal Government through 2020, given multiple projects of Government demand for launch services; the feasibility of the procurement strategy and timeline, given projected funding availabilities; the potential for supporting the research and exploration test bed needs of the Federal Government and of the independent entity responsible for ISS national laboratory activities."
        - "An evaluation of costs and benefits of ensuring the availability of at least 2 U.S.-based launcher service providers, considering: the potential need for diversified cargo and sample return capabilities, including a soft-landing capability;" and "the ability of multiple cargo or crew launch service providers to meet private or non-NASA

Government mission requirements and the subsequent benefit to the United States of such ability."
        - "Justification for the procurement strategy selected from among those considered; and for the selected procurement strategy, identification of additional or modified authorities, regulations, or guidelines that are necessary for successful implementation."
- Section 232 would extend indemnification by 3 years, from December 31, 2013 to December 31, 2016.
- Section 708 would authorize the NASA Administrator to:
- First, "enter into an agreement with covered entity to provide the covered entity with support and services related to the space transportation infrastructure of the Administration."
- Second, "at the request of the covered entity, may include that support and services in the launch reentry range support requirements of the Administration if:
    - "The Administrator determines that including that support and services in the requirements: is in the best interest of the Federal Government; does not interfere with the requirements of the Administration; and does not compete with the commercial space activities of other covered entities, unless that competition is in the national security interests of the United States."
    - "Any commercial requirement included in the agreement has full non-Federal funding before the execution of the agreement."
- In addition, the NASA Administrator would be authorized to "enter into an agreement with a covered entity on a cooperative and voluntary basis to accept contributions of funds, services, and equipment to carry out" section 708. Further, "any funds, services, or equipment accepted by the Administrator," under the authority of section 708, "may be used only for the objectives specified in" section 708, and "in accordance with terms of use set forth in the agreement entered into"; and "shall be managed by the Administrator in accordance with regulations of the Administration."
- The "agreement entered into with a covered entity" would be required to: "address the terms of use, ownership, and disposition of the funds, services or equipment contributed pursuant to the agreement; and include a provision that the covered entity will not recover the costs of its contribution through any other agreement with the United States."
- Finally, section 708 would require the NASA Administrator to provide to the Congress, not later than January 31 of each year, "a report on the funds, services, and equipment accepted and used by the Administrator" under section 708 during the preceding fiscal year.

<u>House passed FY 2015 CJS Appropriations Bill (H.R. 4660):</u>

- The House passed FY 2015 Commerce, Justice, and Science Appropriations bill would appropriate $785 million for the Commercial Crew program in FY 2015, $63 million below the President's FY 2015 base budget request.
- The Committee Report states that the Committee "has provided NASA with substantial resources for the commercial crew program (CCP)." The Committee Report notes that the "CCP appropriations have often exceeded the program's authorized levels and have increased in each of the last four fiscal years despite declining topline spending levels, sequestration and previously expressed concerns about the effective management of Federal investments in the program."
- The Committee Report states that the $785 million for CCP would go to "support one industry partner's advancement through the Commercial Crew Transportation Capability (CCtCap) process." The Committee "believes that this recommendation strikes the appropriate balance between support for the program's underlying goal and caution against management approaches that many in the Congress do not endorse." Further, NASA would be required to "take all steps necessary to incentivize further private investment in the program, including, to the maximum extent possible, taking the industry partners' level of proposed private investment into account as a selection criterion for CCtCap."
- Finally, the Committee Report notes that "each CCtCap proposer has now provided NASA with the flight price that would be charged if that proposer ultimately were to conduct missions to the International Space Station (ISS)." The Committee Report states that "while this information is currently subject to the

CCtCap procurement blackout, NASA shall brief the Committee on expected flight pricing as soon as the blackout period is concluded."

SAC passed FY 2015 CJS Appropriations Bill (S. 2437):

- The SAC passed FY 2015 Commerce, Justice, and Science Appropriations bill would appropriate $805 million for the Commercial Crew program in FY 2015, $43 million below the President's FY 2015 base budget request.
- The Committee Report states that the Committee "has been consistent in its direction that NASA use a FAR-based contract for the development of a domestic crew capability." The Committee Report notes "while NASA has chosen to use a FAR-based contract, it has also waived significant portions of the standard FAR-based contract, including verifiable cost data, capping repayment of funds in case of inability to perform, and rights in data." Further, "NASA has informed the Committee that these deviations were necessary to ensure competition." With that said, the Committee believes "with multiple entrants that collectively have extensive Federal contracting experience," it "questions the true need to waive these traditional requirements."
- In addition, "given the important of the commercial crew program to the long-term viability of the International Space Station, the need for transparency only grows in importance." The Committee believes that "without the proper foundation and necessary requirements for certified cost and pricing data, NASA will have no insight into ongoing cost growth that could jeopardize the viability of the program."
- "In order for NASA and Congress to have the appropriate level of transparency to ensure that the cost of the program is in line with the activities undertaken and that it does not grow exponentially," the Committee would direct NASA to:
    - First, "maintain FAR 15.403-4, related to certified cost and pricing data for prime contractors, for any contract entered into to support the development of a commercial vehicle."
    - Second, "require quarterly reports to be submitted to NASA and the Committee that detail the funds invested by NASA and by the awardees during the previous quarter and cumulatively, including legacy launch systems that may be integrated with the crew vehicle."
- The Committee Report goes on to note that the Committee "agrees with concern expressed by the Aerospace Safety Advisory Panel, the OIG, and others that Space Act agreements may not give NASA sufficient oversight to correct safety defects." Therefore, the Committee would direct NASA "to only place astronauts on a commercial crew vehicle that NASA acquired under a FAR contract that allows NASA to require the company to meet all safety requirements." With that said, the Committee would encourage "NASA to continue working closely with commercial companies, even under Space Act agreements, so that those companies know what will be acceptable should NASA eventually contract for crew transportation services aboard those companies' vehicle." Further, the Committee would encourage "NASA to develop plans to fully utilize NASA-owned rocket testing infrastructure for commercially developed launch vehicles to ensure that these vehicles are not only tested in the same manner as Government-developed launch vehicles but at the same facilities to ensure consistency in testing cross all potential vehicles."

White House Statement of Administration Policy:

- The White House Statement of Administration Policy on the House passed CJS Appropriations Act (H.R. 4660) states that "the Administration appreciates the Committee's support for NASA, but is disappointed the bill does not provide the full funding request for the Commercial Crew Program." The Statement of Administration Policy asserts that "the lower funding level for the program jeopardizes the goal of sending astronauts to the International Space Station on American spacecraft by 2017 and will likely extend the period of time NASA needs to rely on Russia for transport to and from the Station." Therefore, the Administration would encourage "the Congress to support competition in the program, which is important to lowering risk and reducing prices in the long term."

Space Operations

Budget Authority, $ in millions	Consolidated Approps, 2014 (P.L. 113-76)	President's FY 2015 NASA Budget Request	President's FY 2015 NASA Opportunity, Growth, and Security Initiative	HSSTC Proposed NASA Auth FY 2014 (H.R. 4412)	SCSTC Passed NASA Auth FY 2015 (S. 1317)	House passed FY 2015 CJS Approps Act (H.R. 4660)	SAC passed FY 2015 CJS Approps Act (S. 2437)
International Space Station	2,984.1	3,051.0	100.6	2,984.1	3,103.0	3,040.0	3,012.0
Space and Flight Support	793.9	854.6	0.0	793.9	845.0	845.0	828.8
Total	**3,778.0**	**3,904.6**	**100.6**	**3,778.0**	**3,948.0**	**3,878.0***	**3,830.8**

*An amendment would transfer $7 million from Space Operations to the Space Technology account, but it is unknown what program the $7 million would be transferred from.

President's FY 2015 Budget Request for Overall Science Portfolio

In FY 2015 the President base budget requested $3,904 million for Space Operations missions, $126 million above the funds appropriated for Space Operations missions in FY 2015. However, the President requested an additional $100 million for Space Operations missions in his Opportunity, Growth, and Security Initiative. The additional requested funds are as follows:

- $100.6 million for International Space Station – Cargo Flights;

International Space Station

About

As the world's only space-based multinational research and technology testbed, ISS is critical to the future of human space activities. The facility enables scientists to identify and quantify risks to human health and performance and to develop and test countermeasures and technologies to protect astronauts during extended human space exploration. In addition, ISS offers unique opportunities for research and development, allowing scientists to investigate biological and physical processes in an environment very different from that on Earth.

FY 2015 Congressional Action

House passed NASA Authorization Act (H.R. 4412):

- The House passed NASA Authorization Act would authorize $2,984 million for the International Space Station in FY 2014. Section 211 of the bill outlines several Congressional findings regarding the ISS:
    - First, "the International Space Station is the ideal short-term testbed for future exploration development, including long-duration space travel."
    - Second, "the use of the private market to provide cargo and crew transportation services is currently the most expeditious process to restore domestic access to the International Space Station and low-Earth orbit."
    - Third, "government assured access to low-Earth orbit is paramount to the continued success of the International Space Station and National Laboratory."
    - Fourth," Acquiring and maintaining an operational domestic commercial crew transportation service by the year 2017 is of the utmost importance for the future viability of the International Space Station."
- Therefore, with those findings in mind, Section 212 outlines the following policy with regard to the International Space Station:
    - First, "the International Space Station shall be utilized to the maximum extent practicable for the development of capabilities and technologies needed for the future of human exploration beyond low-Earth orbit.
    - Second, "the Administrator shall, in consultation with the International Space Station partners: (a) take all necessary measures to support the operation and full utilization of the International

Space Station; and (b) seek to minimize, to the extent practicable, the operating costs of the International Space Station."
    - Third, "reliance on foreign carriers for crew transfer is unacceptable, and the Nation's human space flight program must acquire the capability to launch United States astronauts on United States rockets from United States soil as soon as is safe and practically possible whether on Government-owned and operated space transportation systems or privately owned systems that have been certified for flight by the appropriate Federal agencies."
- In addition, Section 212 would reaffirm: Congress' "commitment to the development of commercially developed launch and delivery system to the International Space Station for crew missions" expressed in the 2005, 2008, and 2010 NASA Authorization Acts; (2) "that the Administration shall make use of United States commercially provided International Space Station crew transfer and crew rescue services to the maximum extent practicable;" and (3) "that the Administration shall pursue international, commercial, and intravgovernmental means to maximize International Space Station logistics supply, maintenance, and operational capabilities, reduce risks to International Space Station systems sustainability, and offset and minimize United States operations costs relating to the International Space Station."
- Section 212 would codify as policy that the United States "maintain an uninterrupted capability for human space flight and operations in low-Earth orbit, and beyond, as an essential instrument of national security and the capability to ensure continued United States participation and leadership in the exploration and utilization of space."
- Now that the Space Shuttle is retired, the bill would repeal several legal requirements regarding use of the Space Shuttle.
- Section 212 would require the NASA Administration, not later than 1 year after the date of enactment of the bill, to submit to Congress a "report on the feasibility of extending the operation of the International Space Station." The report would be required to include:
    - First, the "criteria for defining the International Space Station as a research success."
    - Second, the "cost estimates for operating the International Space Station to achieve the criteria" for defining the ISS as a research success."
    - Third, the "cost estimates for extending operations to 2020, 2025, and 2030."
    - Fourth, "an assessment of how the defined criteria," regarding the ISS as a research success, "respond to the National Academies Decadal Survey on Biological and Physical Sciences in Space."
- Section 212 would require the Director of the Office of Science and Technology Policy, in consultation with the Administrator, academia, other Federal agencies, the International Space Station National Laboratory Advisory Committee, and other potential stakeholders, to develop and transmit to Congress "a strategic plan for conducting competitive, peer-reviewed research in physical and life sciences and related technologies on the International Space Station through at least 2020." The strategic plan would be required to:
    - First, "be consistent with the priorities and recommendations established by the National Academies in its Decadal Survey on Biological and Physical Sciences in Space."
    - Second, "provide a research timeline and identify resource requirements for its implementation, including facilities and instrumentation necessary for the conduct of such research."
    - Third, identify:
        - "Criteria for the proposed research, including: a justification for the research to be carried out in the space microgravity environment; the use of the model systems; the testing of flight hardware to understand and ensure its functioning in the microgravity environment; the use of controls to help distinguish among the direct and indirect effects of microgravity, among other effects of the flight or space environment; approaches for facilitating data collection, analysis, and interpretation; procedures to ensure repetition of experiments, as needed; support for timely presentation of the

peer-reviewed results of the research; and defined metrics for the success of each study."
        - "Instrumentation required to support the measurements and analysis of the research to be carried out under the strategic plan."
        - "The capabilities needed to support direct, real-time communications between astronauts working on research experiments onboard the International Space Station and the principal investigator on the ground."
        - "A process for involving the external user community in research planning, including planning for relevant flight hardware and instrumentation, and for utilization of the International Space Station, free flyers, or other research platforms."
        - "The acquisition strategies the Administration plans to use to acquire any new capabilities which are not operational on the International Space Station as of the date of enactment" of H.R. 4412 "and which have an estimated total life cycle cost of $10,000,000 or more, along with a justification of any anticipated use of less than full and open competition and written approval thereof from the Administration's Assistant Administrator for Procurement."
        - "Defined metrics for success of the research plan."
- Finally, Section 212 would require the Comptroller General of the United States to submit a report to Congress "on the progress of the organization chosen for the management of the International Space Station National Laboratory." The report would be required to "asses the management, organization, and performance of such organization and shall include a review of the status of each of the 7 required activities listed in section 504(c) of such Act (42 U.S.C. 18354(c))."
- Section 305 would direct the NASA Administrator to "utilize the International Space Station and commercial services for Science Mission Directorate missions in low-Earth orbit wherever it is practical and cost effective to do so."
- Section 502 would direct the NASA Administrator to "utilize the International Space Station and commercial services for Space Technology Demonstration missions in low-Earth orbit wherever it is practical and cost effective to do so."

<u>SCSTC passed NASA Authorization Act (S. 1317):</u>

- The Senate Commerce Committee passed NASA Authorization Act would authorize $3,103 million for the International Space Station in FY 2015, $52 million above the President's FY 2015 base budget request.
- Section 221 states that it is the sense of Congress that:
    - First, "maximum utilization of partnerships, scientific research, commercial applications, and exploration test bed capabilities of the ISS is essential to ensuring the greatest return on investments made by the United States and its international partners in the development, assembly, and operations of that unique facility."
    - Second, "every effort should be made to ensure that decisions regarding the service life of the ISS are made on the basis of its projected capability to continue providing effective and productive research and exploration test bed capabilities."
- Section 221 goes on to reaffirm the policy that "the United States, in consultation with its international partners in the ISS program," will "support full and complete utilization of the ISS through at least 2020." To that end, the NASA Administrator would be required to ensure that the ISS:
    - First, "remains viable as an element of overall exploration and partnership strategies and approaches."
    - Second, "is considered for use by all NASA mission directorates, as appropriate, for technically appropriate scientific data gathering or technology risk reduction demonstrations."
    - Third, "remains an effective, functional vehicle providing research and test bed capabilities for the United States through 2020, up to 2028, and possible beyond."

- In addition, the NASA Administrator, in consultation with the Office of Science and Technology Policy, would be required to "determine, through analyses and discussions with ISS partners, the feasible and preferred service life of the ISS as a unique scientific, commercial, and exploration-related facility." The analyses would be required to be provided to Congress, not later than 120 days after the date of enactment of S. 1317, and triennially thereafter, and include:
    - First, "an assessment of whether ISS operations can be extended to at least 2028, including:
        - "A description of any activities that would be required of the international partnership to ensure that safety requirements are met;"
        - "A general discussion of international partner capabilities and interest in extension, to include the potential for participation by additional countries;"
        - "A review of essential systems or equipment upgrades that would be necessary for ISS extension and utilization to at least 2028;"
        - "An evaluation of the cost and schedule requirements associated with the development and delivery of essential systems or equipment upgrades" identified above.
        - "An identification of possible partner contributions and program transitions to provide the upgrades" identified above.
    - Second, "an evaluation of the potential for expanding the use of ISS facilities to accommodate the needs of researchers and other users, including changes to policies, regulations, and laws that would stimulate greater private and public involvement on the ISS."
    - Third, any "other information as may be necessary to fully describe the justification for and feasibility of extending the service life of the ISS, including the potential scientific or technological benefits to the Federal Government or public, or to academic or commercial entities that, within the United States-owned modules of the ISS or in partner-owned facilities of the ISS allocated for United States utilization by international agreement, are or may become engaged in research and testing activities sponsored, conducted, and managed by the Administrator or by the ISS management entity."
- Section 222 states that it is the sense of Congress that:
    - First, "expansion of the non-NASA utilization of the ISS is critical to maximizing the research potential of the ISS national laboratory and to facilitating expanded commercial activity in low-Earth orbit."
    - Second, "in order to expand the non-NASA scientific utilization of ISS research capabilities and facilities, it is essential to clarify the roles and responsibilities of the entities managing research within the U.S. Segment of the ISS."
- In addition, Section 222 would require the NASA Administrator to provide to Congress, not later than 180 days after the enactment of S. 1317, a report that includes:
    - First, "options for expanding the Administration's collaboration with its ISS partners, including: providing U.S. personnel expanded access to international partner research facilities; and coordinating research efforts to minimize the duplication of effort, unless duplication is a justified element of the scientific process or essential for backup or redundant capability."
    - Second, "the potential for increasing ISS crew size to maximize utilization and applications."
    - Third, "efforts undertaken by the Administration and the ISS management entity: to enhance collaborative research between the Administration and other Federal science agencies, such as the National Institutes of Health and the National Science Foundation; and to expand the use of the ISS national laboratory capabilities by Federal science agencies."
- Section 223 would all the NASA Administrator to waive the license reserved by the Administrator, "with respect to any invention or class of inventions made or which may be made by any person or class of persons in the performance of any non-NASA scientific utilization of the ISS national laboratory." The waiver can be "in whole or in part," and also can be waived "if the Administrator finds that the reservation of the license by the Administrator would substantially inhibit the commercialization of an invention."

House passed FY 2015 CJS Appropriations Bill (H.R. 4660):

- The House passed FY 2015 Commerce, Justice, and Science Appropriations bill would appropriate $3,040 million for the ISS in FY 2015, $11 million below the President's FY 2015 base budget request.
- The Committee Report states that the Committee "remains concerned that annual ISS operations costs are too high, particularly in light of NASA's proposal to extend the life of the Station through 2024." Further, "for the Station to remain a sustainable long-term program, NASA must continue to seek and implement cost savings measures with the goal of reducing the ISS operations budget or, at a minimum, slowing the growth in such budget." Therefore, "with respect to Fiscal Year015 ISS funding, all reductions from the request level" would be required to "be implemented in the operations budget rather than ISS research or crew and cargo transportation."
- The Committee Report goes on to state that "NASA's budget request continues to allocate insufficient funding and effort to ISS research." The Committee Report notes that the "apparent increase in the request for research funding is only due to the transfer of in-space robotic servicing work from the ISS operations budget, and nearly 60 percent of total research resources are dedicated to logistical support rather than research activities." The Committee "believes that this imbalance must be addressed, with a greater share of research funding going to actual physical and biological science research." Therefore, the Committee would direct "NASA to develop a strategy for accomplishing this goal over the next five fiscal years." The strategy would be required to be provided no later than 120 days after the enactment of this Act.
- Finally, "with respect to in-space robotic servicing, the Committee notes that the Defense Advanced Research Projects Agency is also investing in technologies to repair and/or refuel satellites on-orbit and cautions NASA to minimize any duplication of effort between the two agencies' activities."

SAC passed FY 2015 CJS Appropriations Bill (S. 2437):

- The SAC passed FY 2015 Commerce, Justice, and Science Appropriations bill would appropriate $3,012 million for the ISS in FY 2015, $39 million below the President's FY 2015 base budget request.
- The Committee Report states that the Committee "has consistently supported the construction and operation of the ISS on the promise that it would support world-class, international science that could improve life on Earth." Further, the Committee "is encouraged by NASA's recent announcement in January 2014 to extend the life of International Space Station [ISS] to 2024," and would encourage NASA to "work with its international partners to ensure this new goal is financially viable to maintain a high level of safety and sufficient research production."
- The Committee Report also notes that the Committee "considers astronaut safety its highest priority and maintains support for the Aerospace Safety Advisory Panel's recommendation that NASA reconsider its criteria for future human spaceflight to the ISS."

Space and Flight Support

About

Space and Flight Support consists of multiple programs providing Agency-level capabilities critical to the success of NASA missions and goals.

FY 2015 Congressional Action

House passed NASA Authorization Act (H.R. 4412):

- The House passed NASA Authorization Act would authorize $793 million for Space & Flight programs in FY 2014.

SCSTC passed NASA Authorization Act (S. 1317):

- The Senate Commerce Committee passed NASA Authorization Act would authorize $845 million for Space & Flight programs in FY 2015, $9 million below the President's FY 2015 base budget request.
- Section 707 states that it is a sense of Congress, with regard to infrastructure, that:
    - First, "the Administration has a role in providing access to unique or specialized laboratory capabilities that are not economically viable for purchase by commercial entities and therefore are not available outside of NASA."

    - Second, “the deteriorating condition of the Administration’s facilities and other infrastructure is hampering the research effectiveness and efficiency performed at those facilities by both the Administration and industry participants.”
    - Third, “the Administration must improve the condition of its facilities and infrastructure to maintain the competitiveness the U.S. aerospace industry.”
    - Fourth, “to ensure continued researcher access to reliable and efficient world-class facilities, the Administration should seek to establish strategic partnerships with other Federal agencies, academic institutions, and industry, as appropriate.”
    - Fifth, “decisions regarding whether to dispose of, maintain, or modernize existing facilities and other infrastructure must be made in the context of meeting the future laboratory needs of the Administration and other Federal agencies.”
- Therefore, the Committee would direct the NASA Administrator, not later than 1 year after the date of enactment of S. 1317, to provide Congress with “a plan for retaining or acquiring the facilities, laboratories, equipment, test capabilities, and other infrastructure necessary to meet the Administration’s mandates and its current and future missions.” The plan would be required to include:
    - First, identifying “the Administration’s future infrastructure needs, including facilities, laboratories, equipment, and test capabilities.”
    - Second, “include a strategy for identifying and removing unnecessary or duplicative infrastructure consistent with the national strategic direction under the National Space Policy, the National Aeronautics Research, Development, Test and Evaluation Infrastructure Plan,” and the NASA Authorization Act of 2010.
    - Third, “include a strategy for the maintenance, repair, upgrading, and modernization of the Administration’s facilities, laboratories, equipment, and other infrastructure.”
    - Fourth, “recommend criteria for prioritizing deferred maintenance tasks and for upgrading or modernizing facilities, laboratories, equipment, and other infrastructure.”
    - Fifth, “include an assessment of modifications needed to maximize the use of facilities, laboratories, equipment, and other infrastructure that offer unique and highly specialized benefits to the aerospace industry and the public.”
    - Sixth, “include recommendations for implementation, including a timeline, milestones, and an estimate of the resources required for carrying out the plan.”
- In addition, the NASA Administrator would be required to “establish a capital fund at each of NASA’s field centers for the modernization of facilities, laboratories, equipment, and other infrastructure” in accordance with the above plan. Further, the NASA Administrator would be directed to “ensure, to the greatest extent practicable, that any financial savings achieved by closing an outdated or surplus facility at a NASA field center is made available to that field center’s capital fund for the purpose of modernizing that field center’s facilities, laboratories, equipment, and other infrastructure.”

<u>House passed FY 2015 CJS Appropriations Bill (H.R. 4660):</u>

- The House passed FY 2015 Commerce, Justice, and Science Appropriations bill would appropriate $845 million for Space and Flight Support in FY 2015, $9 million below the President’s FY 2015 base budget request.

<u>SAC passed FY 2015 CJS Appropriations Bill (S. 2437):</u>

- The SAC passed FY 2015 Commerce, Justice, and Science Appropriations bill would appropriate $829 million for the Space and Flight Support in FY 2015, $25 million below the President’s FY 2015 base budget request.

Space Technology

Budget Authority, $ in millions	Consolidated Approps, 2014 (P.L. 113-76)	President's FY 2015 NASA Budget Request	President's FY 2015 NASA Opportunity, Growth, and Security Initiative	House passed NASA Auth FY 2014 (H.R. 4412)	SCSTC Passed NASA Auth FY 2015 (S. 1317)	House passed FY 2015 CJS Approps Act (H.R. 4660)	SAC passed FY 2015 CJS Approps Act (S. 2437)
Crosscutting Space Technology	--	256.6	--	--	--	-	-
Exploration Technology Development	--	224.5	--	--	--	-	-
Small Business Innovation Research	--	190.7	--	--	--	-	-
Partnership Development & Strategic Integration	--	33.8	--	--	--	-	-
Total	**576.0**	**706.0**	**100.0**	**576.0**	**650.0**	**627.0**	**580.2**

President's FY 2015 Budget Request for Overall Space Technology Portfolio

In FY 2015 the President base budget requested $706 million for Space Technology missions, $130 million above the funds appropriated for Space Technology missions in FY 2015. However, the President requested an additional $100 million for Space Technology missions in his Opportunity, Growth, and Security Initiative. The additional requested funds are as follows:

- $21.0 million for Closed Loop Life Support Systems: ISS Utilization;
- $18.0 million for Composite Structural Technologies;
- $10.0 million for Robotics Challenge;
- $7.0 million for Advanced Manufacturing;
- $10.0 million for Small Spacecraft Technology Demonstrations;
- $6.0 million for In-Space Assembled and Manufactured Structures;
- $6.0 million for NASA Innovative Advanced Technologies;
- $18.0 HIAD-Commercial Cargo Vehicles;
- $4.0 million for Lander and Ascent Vehicle Composites;

FY 2015 Congressional Action

House passed NASA Authorization Act (H.R. 4412):

- The House passed NASA Authorization Act would authorize $576 million for Space Technology programs in FY 2014.
- Section 501 states that Congress, with regard to Space Technology, finds the following:
    - First, "The Space Technology Mission Directorate created by the Administration is lacking an organic statutory authorization and in need of congressional direction."
    - Second, "In order to appropriately prioritize the Administration's resources to accomplish its goals and purposes, the Space Technology Mission Directorate needs to be reorganized as provided in the amendments made by" Section 501.
    - Third, "Projects, programs, and activities currently within the Exploration Research and Development program should continue as planned as part of the Human Exploration and Operations Mission Directorate."
- Toward that end, Section 501 would amend Section 70507 of title 51, United States Code, to authorize Space Technology Program as follows:

- First, "the Administrator shall establish, within the office of the Administrator, a Space Technology Program to pursue the development of technologies that enable exploration of the solar system or advanced space science throughout the various elements of the Administration."
- Second, "the Administrator shall organize and manage the Administration's Small Business Innovation Research program and Small Business Technology Transfer program within the Space Technology Program."
- Third, "the Administrator shall include in the budget for each fiscal year, as transmitted to Congress under section 1105(a) of title 31, a certification that no project, program, or mission undertaken by the Space Technology Program is independently under development by any other office or directorate of the Administration."

<u>SCSTC passed NASA Authorization Act (S. 1317):</u>

- The Senate Commerce Committee passed NASA Authorization Act would authorize $650 million for Space Technology programs in FY 2015, $56 million below the President's FY 2015 base budget request.
- Section 501 states that it is a sense of Congress, with regard to Space Technology, that:
  - First, "previous investments in space technologies have not only enabled space exploration and research missions, but also have improved the quality of life on Earth;"
  - Second, "by improving affordability, reliability, and operational capability, continued space technology developments will enable NASA missions that otherwise would be unachievable;"
  - Third, "investments in space technology engage the talent of the Administration and of the Nation's academic and business enterprises;" and
  - Fourth, "space technology roadmaps serve as a useful framework for NASA, academic, and industry development efforts;"
- Section 501 would direct the NASA Administrator to "continue a program with responsibility for NASA investments in space technologies and capabilities" in order to "advance NASA's space exploration and space research goals." Further, the Administrator would be required to "synergize all NASA space technology investments, encourage collaboration in space technology development with academia and industry, and minimize duplication of space technology development efforts across the Administration and the private sector unless duplication is required to maintain mission safety, security, or backup capability."
- Finally, Section 501 would require the Administrator to "submit to the appropriate committees of Congress, not later than 24 months after the date of enactment of this Act, a progress report on the development, testing, and demonstration of the 14 technological areas of the Space Technology Roadmaps."

<u>House passed FY 2015 CJS Appropriations Bill (H.R. 4660):</u>

- The House passed FY 2015 Commerce, Justice, and Science Appropriations bill would appropriate $627 million for the Commercial Crew program in FY 2015, $79 million below the President's FY 2015 base budget request.
- The Committee Report states The Committee Report states that Committee "appreciates the efforts of the Space Technology Mission Directorate (STMD) to demonstrate more clearly the alignment between its major technology projects and the needs of its customers in SMD, the Aeronautics Research Mission Directorate, the Human Exploration and Operations Mission Directorate and private industry."
- The Committee "believes that STMD should prioritize funds toward those technologies that have the broadest applicability across the STMD customer base, especially supersonic and hypersonic decelerators for improved entry, descent and landing capabilities; solar electric propulsion for increased efficiency in the transportation of space-borne objects; laser and optical communications for reduced spectrum usage and increased data return capabilities; and the deep space atomic clock for more accurate deep space navigation."

- Finally, "in the event the NASA updates or otherwise revises its current space technology roadmaps, the modified roadmaps shall be submitted to the same external evaluation and prioritization process as the original documents."

SAC passed FY 2015 CJS Appropriations Bill (S. 2437):

- The SAC passed FY 2015 Commerce, Justice, and Science Appropriations bill would appropriate $580 million for the Space Technology in FY 2015, $125 million below the President's FY 2015 base budget request.
- The Committee Report notes "within Space Technology, the Committee prioritizes funding for ongoing activities including Crosscutting Space Technology." In addition, the Committee would recommend "Space Technology continue to fund satellite servicing in concert with the Space Operations directorate." The Committee Report states that this "funding will contribute to a competitive demonstration mission and shall be managed by the Space Operations mission directorate."

White House Statement of Administration Policy:

- The White House Statement of Administration Policy on the House passed CJS Appropriations Act (H.R. 4660) states that "the Administration is concerned that the bill does not fund the full request for the Space Technology program." The Statement of Administration Policy notes, "Space Technology is important to reducing the cost and increasing the capability of NASA, other Government, and commercial space activities."

About the Space Foundation

The foremost advocate for all sectors of the space industry and an expert in all aspects of space, the Space Foundation is a global, nonprofit leader in space awareness activities, educational programs that bring space into the classroom and major industry events, including the *Space Symposium*, all in support of its mission "to advance space-related endeavors to inspire, enable and propel humanity." The Space Foundation publishes *The Space Report: The Authoritative Guide to Global Space Activity* and provides three indexes that track daily U.S. stock market performance of the space industry. Through its Space Certification™ and Space Technology Hall of Fame® programs, the Space Foundation recognizes space-based technologies and innovations that have been adapted to improve life on Earth. The Space Foundation was founded in 1983 and is based in Colorado Springs, Colo. Its world headquarters features a public Visitors Center with two main areas - the El Pomar Space Gallery and the Northrop Grumman Science Center featuring Science On a Sphere®. The Space Foundation also conducts research and analysis and government affairs activities from its Washington, D.C., office and has a field office in Houston, Texas. For more information, visit www.SpaceFoundation.org. Follow us on Facebook, LinkedIn and Twitter, and read about the latest space news and Space Foundation activities in *Space Watch*.

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