HOLD FOR RELEASE
UNTIL PRESENTED
BY WITNESS
February 13, 2007

Statement of
Michael D. Griffin
Administrator
National Aeronautics and Space Administration

before the

Committee on Science and Technology
U.S. House of Representatives

Mr. Chairman and Members of the Committee, thank you for the opportunity to appear today to discuss the President's FY 2009 budget request for NASA. The President's budget request for NASA is $17.6 billion, a 2.9 percent increase over the net budget authority enacted for 2008, along with a steady, five-year runout commensurate with inflation. This increase demonstrates the President's commitment to funding the balanced priorities he set forth for the Agency in space exploration, Earth and space science, and aeronautics research. We are making steady progress in achieving these goals. I ask for your continued support as you consider the President's FY 2009 budget request for NASA.

When I testified before this Committee last year, I spoke about the Administration's balanced priorities for our Nation's civil space and aeronautics research goals as set forth by the NASA Authorization Act of 2005 (P.L. 109-155) and the Vision for Space Exploration. NASA's mandate is clear, and the NASA Authorization Act of 2005, as well as the level of funding appropriated to NASA in FY 2008, tells me that Congress broadly endorses the balanced set of programs the Agency has put forward in this era of limited budget growth.

I have said this in other forums, but it warrants repeating here: at present funding levels, NASA's budget is sufficient to support a variety of excellent space programs, but it cannot support all of the potential programs we could execute. No plan or level of funding can fully satisfy all the many constituencies we have. Balanced choices must be made. But they cannot continually be remade and revisited if there is to be steady progress toward our common, defined objectives.

As the Columbia Accident Investigation Board noted, and as stakeholders acknowledged in ensuing policy debates, it would have been far worse to continue with the prior lack of strategic direction for human space flight, to continue dithering and debating and inevitably widening the gap between Shuttle retirement and the availability of new systems. Until and unless the Congress provides new and different authorization for NASA, the law of the land specifies that we will complete the International Space Station, retire the Shuttle, design and build a new spaceflight architecture, return to the Moon in a manner supporting a "sustained human presence," and prepare the way to Mars.

We are doing those things as quickly and efficiently as possible. System designs for the early elements have been completed, contracts have been let, and consistently solid progress is being made with a minimum of unexpected difficulty. True, the progress might be slower than all of us would prefer, but applying resources in the right direction, irrespective of pace, is always productive -- and we are doing

that. The Ares I Crew Launch Vehicle and the Orion Crew Exploration Vehicle, as they are presently taking form, are the building blocks for any American future beyond Low Earth Orbit (LEO).

Given that this endeavor will be our first step beyond LEO for crewed spacecraft since 1972, I believe that bypassing the Moon to venture directly into deep space -- a proposal some have suggested revisiting -- poses unacceptable risk. Returning to the Moon and consolidating the gains to be made thereby will set us properly on the path toward Mars. I believe that the NASA Authorization Act of 2005 remains the finest policy framework for United States civil space activities that I have seen in forty years. And, I thank this Committee for its leadership role in crafting this legislation. I ask for your continued support and leadership as we progress toward achieving the worthy National objectives laid out in the Act.

In the invitation to testify today, you asked that I be prepared to discuss NASA's initial FY 2008 Operating Plan, submitted to the Committee on February 1, 2008. I would be pleased to respond to any questions you may have on the details. In summary, the initial Operating Plan provides aggregate funding of $17.3 billion, at the level of the President's FY 2008 request. Pursuant to the rescission of $192.5 million in NASA unobligated balances in the Consolidated Appropriations Act, 2008 (P.L. 110-161), aggregate funding in NASA's FY 2007 Operating Plan is reduced by $185.2 million, and prior year balances are reduced by $7.2 million. Implementation of direction in P.L. 110-161 has resulted in a total reduction of $620.9 million in planned NASA activities, consisting of the rescission of $192.5 million, offsets for programmatic augmentations totaling $345.2 million, and site-specific Congressional interest items totaling $83.2 million. Finally, in accordance with Congressional direction, NASA has established seven Agency appropriations accounts in the FY 2009 budget request. As a result, the budgets for NASA's programs and projects are requested only in terms of direct costs, not the additional indirect costs associated with operating the Agency's field Centers, safety and mission success and Agency management and operations. The direct budgets will continue to reflect labor, travel, and procurement costs associated with each program and project. The indirect costs are now budgeted solely within the Cross Agency Support account, and not in the NASA programs and projects. We will strive to ensure that these changes are transparent to our stakeholders.

I am appreciative of the action by the Committees on Appropriations and Congress in providing regular FY 2008 appropriations for the Agency at the level of the President's request, including essentially full funding for the Orion, the Ares I, the Space Shuttle, and the Space Station. This total FY 2008 appropriations level, with some adjustments within the total, will enable NASA to meet critical priorities in accordance with the direction from the Congress and the President.

Highlights of the NASA FY 2009 Budget Request

I am pleased to report that the FY 2009 budget represents a substantial step forward in responding to the recommendations of the National Research Council's (NRC) first decadal survey of Earth Science, released in January 2007. The five-year budget runout requests $910 million for priorities enumerated in the report. Funding will support development of two Decadal Survey new mission priorities -- the Soil Moisture Active/Passive (SMAP) mission scheduled to launch as early as 2012, and the Ice, Clouds, land Elevation Satellite II (ICESat II) scheduled to launch in 2015 – as well as formulation of three additional decadal survey missions.

Working closely with NOAA, we also are making significant progress toward restoring climate sensors that had been removed from the tri-agency National Polar-Orbiting Operational Environmental Satellite System (NPOESS) in 2006. The FY 2009 budget request of $74 million for NOAA supports the addition of a Clouds and the Earth's Radiant Energy System (CERES) instrument onto NASA's NPOESS Preparatory Project (NPP) satellite, set to launch in 2010; instrument development and ongoing analyses

to identify a suitable satellite platform for hosting the Total Solar Irradiance Sensor (TSIS); and development of climate data records. These actions, which will be implemented through close coordination between NASA and NOAA, come in addition to the inclusion of the Ozone Mapping and Profiler Suite (OMPS)-Limb sensor on the NPP satellite that was announced earlier in 2007.

The Agency's FY 2009 budget request also reflects a number of exciting developments in the space sciences, including an increase in the number of new missions, a new initiative in lunar science and initiation of plans for high priority missions in Astrophysics and Planetary Exploration. The FY 2009 request includes an increase of $344 million over five years for Lunar Science in order to better understand our Moon. NASA's Science mission directorate, with support from the Exploration directorate is developing two small lunar landers, and the Science Mission Directorate is initiating a series of new and exciting missions headed to the Moon over the next decade. Meanwhile, we are focusing our Mars program after 2013 on a Mars sample return mission to launch by 2020, and have identified funds to initiate development of an outer planets flagship mission to be selected in October of this year for launch by 2017. The budget also significantly increases Research and Analysis funds in the space sciences to gain better value from the missions we are flying, and so too, it increases the funding and, therefore, the flight rate of our suborbital rocket and balloon research programs in the space sciences.

Our Aeronautics Research portfolio is positioned to address the challenges facing the Next Generation Air Transportation System, while also developing world-class aeronautics expertise and capabilities. Research is aligned with the National Plan for Aeronautics Research and Development and Related Infrastructure, approved by the President in December 2007. In FY 2009, we will conduct a key test to advance our understanding of aircraft aging and durability, and develop algorithms to optimize the use of crowded airspace and airports. We will continue work on blended-wing-body aircraft, which may reduce fuel consumption and emissions, as well as aircraft noise. Additionally, NASA's Aeronautics Research Mission Directorate continues to strengthen partnerships with academia, industry, and other government agencies to accomplish its strategic goals.

NASA's commitment to its exploration objectives is clearly reflected in the FY 2009 budget request. As assembly of the Space Station nears completion, NASA will increasingly focus its efforts on continuing the development of the Orion Crew Exploration Vehicle and Ares I Crew Launch Vehicle. This budget request maintains Orion initial operational capability in March 2015, and full operational capability in FY 2016, though we are striving to bring this new vehicle on line sooner. In FY 2008, we will see the completion of the formulation phase for major elements of the Constellation program; both Orion and Ares I will undergo their preliminary design reviews. We will conduct the first Ares ascent development flight test with the Ares I-X in the Spring of 2009, and we will continue to conduct research and develop and test technologies through the Advanced Capabilities Human Research and Exploration Technology Development Program. The Lunar Reconnaissance Orbiter (LRO)/Lunar Crater Observation Sensing Satellite (LCROSS), an important part of NASA's lunar exploration strategy, is on track for launch at the beginning of FY 2009. The Agency is also requesting $173 million to provide incentives for entrepreneurs—from big companies or small ones—to develop commercial transport capabilities to support the International Space Station. With more than $2.6 billion in NASA funds available over the next five years to purchase cargo and crew services to support Space Station operations, our objective and strong preference is to use these funds to purchase these services from American commercial companies wherever possible.

While I would prefer that the United States have domestic alternatives to purchasing crew transport services from Russia, I am glad that the Russians are our partners and have such capabilities, because the consequences if they were not available are far worse. If NASA astronauts were not onboard the Space Station, our National Laboratory in space simply would not survive. If there is no Space Station, there is no market for the commercial providers we are trying to help bring into existence, and our international

partnership would simply fall apart. So in order to keep these objectives viable, NASA may need to obtain additional crew and cargo transport services from our international partners if U.S. commercial services are not yet demonstrated and available.

In the area of Space Operations, NASA's FY 2009 budget request will allow us to continue to expand the Space Station, complete the supporting truss structure and solar arrays, and deliver the final component of the Japanese laboratory. This will round out the set of three space laboratories aboard the Station, with one each from the U.S., Europe, and Japan. In addition, FY 2009 will mark another milestone for the Space Station Program—for the first time, the Station will be able to support a full-time crew of six astronauts. With three major scientific facilities available to them, these larger crews will be busy as Station kicks off a new era in microgravity research aboard this National Laboratory in orbit. Critical to these achievements, the Space Shuttle is scheduled to fly four times in FY 2009. During that year, NASA also plans to launch payloads on eight expendable launch vehicles. FY 2009 will also see the consolidation of the Deep Space, Near-Earth, and Space Communications networks into a unified Space Communications and Navigation (SCaN) architecture within the Space Operations Mission Directorate.

NASA is continuing to transition from the Space Shuttle to new Exploration systems, and will need a complement of critical tools and authorities necessary for the transformed Agency to execute its mission. This transition is the largest and most daunting since the end of the Apollo program and the beginning of the Space Shuttle program. It dictates that we obtain the authorities needed to ensure sufficient support in the future. We hope to discuss the details of these legislative requests with Members of Congress in the weeks ahead.

The remainder of my testimony outlines the FY 2009 budget request for NASA in greater detail.

Science Mission Directorate

In 2007, NASA successfully launched four new orbital and planetary science missions (THEMIS, AIM, Phoenix, and Dawn), almost 20 suborbital science missions, and two major airborne Earth science campaigns. This past year also saw the first test flights of the Stratospheric Observatory for Infrared Astronomy (SOFIA) 747 airborne infrared observatory, as well as the provision of rapid-response airborne remote sensing aid to the California wildfire emergencies. In addition, 2007 was a year of remarkable scientific discovery about the Earth, the Sun, the planets and the universe. For example, data from the Ice, Cloud, and land Elevation Satellite (ICESat), the Gravity Recovery and Climate Experiment (GRACE), and other satellites have provided dramatic new insights on ice sheet changes in Greenland and Antarctica. The Solar TErrestrial RElations Observatory (STEREO) satellites (A and B) have provided the first three dimensional images of the sun and the structures of the heliosphere. These new 3-D views, along with unprecedented observations from Hinode (Solar-B), NASA's Time History of Events and Macroscale Interactions during Substorms (THEMIS) mission, and the Aeronomy of Ice in the Mesosphere (AIM) satellite are revolutionizing knowledge of the variable Sun and its interactions with the Earth. Also, the Cassini spacecraft radar imagery of Titan revealed large lakes of methane in Titan's North polar region, indicating a hydrological cycle. Finally, a new map provides the best evidence to date that normal matter, largely in the form of galaxies, accumulates along the densest concentrations of dark matter. Mapping dark matter's distribution in space and time is fundamental to understanding how galaxies grew and clustered over billions of years.

NASA's FY 2009 budget request provides $4.44 billion for the Agency's Science portfolio to study the Earth, our Sun and its heliosphere, our solar system, and the Universe. This funding enables NASA's Science Mission Directorate (SMD) to start major new missions, to increase research and analysis funding, and to operate and provide ground support for 55 operating science missions, including 13 Earth

science mission extensions. It provides support for over 3,000 current operating research and analysis grants, while continuing to develop high priority missions in Earth Science, Heliophysics, Planetary Science and Astrophysics, consistent with the priorities established by the NRC's decadal surveys.

Pursuant to requirements of the NASA Authorization Act of 2005 (P.L. 109-555), and consistent with the latest notification provided to the Committee on February 11, 2008, NASA is in the process of producing more detailed reports on budget adjustments and schedule changes which have occurred since NASA submitted its FY 2006 and FY 2007 Baseline Reports under the Act. Detailed reports are in work and planned for submission to the Committee in March 2008 on Aquarius, Glory, Herschel, Kepler, NPP, and OCO. In addition, Glory has exceeded the 30 percent cost threshold triggering additional requirements as provided in the Act. Initial notifications are now in work under the processes established by act the Act for schedule changes for GLAST and SOFIA.

The FY 2009 budget request for Earth Science provides $1.37 billion to help us better understand the Earth's atmosphere, lithosphere, hydrosphere, cryosphere, and biosphere as a single connected system. In addition to 14 operating missions, the request includes funding for seven missions in development. The Landsat Data Continuity Mission and Ocean Surface Topography Mission (to launch in 2008) continue the decades-long time series of land cover change and ocean surface height data, respectively. Glory targets the impact of aerosols on climate. The National Polar-orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP) paves the way for the future national weather system and continues essential measurements from the NASA Earth Observing System (EOS), Aquarius, and the Orbiting Carbon Observatory (OCO), set to launch in 2008. Aquarius and OCO will make the first-ever global measurements of ocean surface salinity and atmospheric carbon dioxide, respectively. The request specifically increases funding for OCO and the Aquarius missions to maintain development schedules. The Global Precipitation Measurement (GPM) mission will extend the rainfall measurements made by the Tropical Rainfall Measurement Mission (TRMM) to the global scale. The request retains the GPM core mission launch readiness date.

The budget request responds to the Earth Science Decadal Survey by establishing a funding wedge of $910.0 million over the budget runout to initiate five new earth Decadal Survey missions for launch by 2020, while continuing to implement seven precursor missions for launch between 2008 and 2013. NASA will continue to contribute to the President's Climate Change Research Initiative by collecting data sets and developing predictive capabilities that will enable advanced assessments of the causes and consequences of global climate change.

The Heliophysics budget request of $577.3 million will support missions to understand the Sun and its effects on Earth, the solar system, and the space environmental conditions that explorers will experience, and to demonstrate technologies that can improve future operational systems. The request increases budgets for Sounding Rockets, Research Range, and Research and Analysis to achieve a more robust level of small payload opportunities. In addition to supporting 16 currently operational missions, the request supports the Interstellar Boundary Explorer (IBEX) mission focused on the detection of the very edge of our solar system and the Coupled ion-Neural Dynamics Investigation (CINDI) "Mission of Opportunity" that will provide new insight on the Earth's ionospheric structure, both of which are planned for launch in 2008. In early FY 2009, the Solar Dynamics Observatory (SDO) to study the Sun's magnetic field is planned for launch, and the Geospace Radiation Belt Storm Probes (RBSP) mission will begin development. RBSP will improve our understanding of how the Earth's radiation belts are formed and how solar output modifies the Earth's Van Allen radiation belts. Further, the five-year budget funds a new Solar Probe mission which has long been sought by the U.S. scientific community and is recommended highly in the most recent Heliophysics decadal survey.

The Planetary Science budget provides $1.33 billion to advance scientific knowledge of the solar system, search for evidence of life, and to prepare for human exploration. The budget supports an array of eight currently operating spacecraft and rovers traveling to or now studying Mercury, Mars, the Asteroid Belt, Saturn, and Pluto, in addition to a series of instrument missions of opportunity. The budget request augments Lunar Science to include a series of small robotic lunar satellites to begin development in FY 2009 and initiates an outer planets flagship mission, planned for launch in 2016 or 2017. The request includes continuation of funds for all five of NASA's operating Mars missions, the development of a Mars Science Laboratory in 2009 and a Mars Scout mission in 2013. The Mars Program is redirected to focus on the Mars Sample Return mission after the Scout 2013 opportunity, while expanding U.S. participation on the ESA/ExoMars mission by selecting two instrument Missions of Opportunity for study and technology development. With the New Horizons spacecraft continuing on its way to Pluto, the request realigns the New Frontiers Program's Juno Mission to Jupiter to be consistent with a 2011 launch date, and funds initiation of the next New Frontiers mission. An open competitive solicitation for the next mission is planned for release near the end of this calendar year. The request continues support for the operating Discovery mission and for the development of the new Gravity Recovery and Interior Laboratory (GRAIL) Discovery mission, the latter of which will use high-quality gravity field mapping of the Moon to determine the moon's interior structure.

The Astrophysics budget provides $1.16 billion to search for answers to fundamental questions about how the universe works, how we got here, and whether we are alone. The request supports a restart of the Nuclear Spectroscopic Telescope Array (NuSTAR) Small Explorer with a launch date of no-earlier-than 2011, increases funding for sounding rocket payloads, balloon payloads, detector technology and theory, and initiates the Joint Dark Energy Mission (JDEM) in FY 2009. The Astrophysics suite of operating missions includes three Great Observatories (Hubble Space Telescope, Chandra X-Ray Observatory and the Spitzer Space Telescope), which have helped astronomers unravel the mysteries of the cosmos. The request will support the Gamma-ray Large Area Space Telescope (GLAST), which is now planned for launch in May, 2008, to begin a five-year mission mapping the gamma-ray sky and investigating gamma-ray bursts. It also provides funding for the Kepler telescope, which is planned for launch in February 2009, to detect planets in the "habitable zone" around other stars. SOFIA will begin science operations in 2009, significantly earlier than previously planned. The request supports development of the Wide-field Infrared Survey Explorer (WISE), which will conduct an all-sky survey, and the James Webb Space Telescope, which will explore the mysterious epoch when the first luminous objects in the universe came into being after the Big Bang.

Aeronautics Research Mission Directorate

In 2007, the Aeronautics Research Mission Directorate (ARMD) continued to pursue high-quality, innovative, and cutting-edge research that develops revolutionary tools, concepts, and technologies to enable a safer, more flexible, environmentally friendly, and more efficient national air transportation system. ARMD's research also plays a vital role in supporting NASA's space exploration activities. ARMD's program content and direction is consistent with the National Aeronautics Research and Development Policy, as well as the follow-on National Plan for Aeronautics Research and Development and Related Infrastructure that the President approved on December 21, 2007.

A primary goal across all of the programs in ARMD is to establish strong partnerships with industry, academia, and other government agencies in order to enable significant advancement in our Nation's aeronautical expertise. NASA has put many mechanisms in place to engage academia and industry, including industry working groups and technical interchange meetings at the program and project level, Space Act Agreements for cooperative partnerships, and the NASA Research Announcement (NRA) process that provides for full and open competition for the best and most promising research ideas.

ARMD has established over 35 Space Act Agreements with industry partners and more are in the works. We have ensured that all Space Act Agreements are negotiated so that results of collaborations will be broadly disseminated. To date, NASA has selected 346 proposals for negotiation of award through the NRA process from more than 70 different universities and 60 different companies and non-profits. NASA investment in NRAs will increase steadily from FY 2009 ($72 million) through FY 2013 ($100 million).

We have also strengthened our partnerships with other government agencies. For example, NASA and the Joint Planning and Development Office (JPDO) have established quarterly reviews to ensure close coordination, and NASA participates in all major JPDO planning activities. In addition, NASA and the Federal Aviation Administration have developed a joint program plan for the Aviation Safety Information Analysis and Sharing (ASIAS) effort with well defined roles and responsibilities. Also, NASA and the U.S. Air Force have established an Executive Research Council that meets at least twice a year to ensure close coordination and collaboration. Lastly, NASA and the Army have signed a Memorandum of Understanding to coordinate research efforts on rotorcraft.

In FY 2009, the President's budget for NASA requests $446.5 million for Aeronautics Research. ARMD is directly addressing the fundamental research challenges that must be overcome in order to enable the JPDO vision for the Next Generation Air Transportation System (NextGen).

NASA's Airspace Systems Program has partnered with the JPDO to help develop concepts, capabilities and technologies that will lead to significant enhancements in the capacity, efficiency and flexibility of the National Airspace System. In FY 2009, NASA's budget request will provide $74.6 million for the Airspace Systems Program to conduct trajectory analyses for service-provider-based automated separation assurance with time-based metering in an environment with two to three times capacity and with delay and separation comparable to or better than that achieved today. In addition, the Airspace Systems Program will develop algorithms to generate robust, optimized solutions for airport surface traffic planning and control. These surface models will be developed as a basis for the optimized use of super-density airports, integrated airport clusters, and terminals where demand for runways is high.

NASA's Fundamental Aeronautics Program conducts research in all aeronautics disciplines that enable the design of vehicles that fly through any atmosphere at any speed. The FY 2009 budget request, amounting to $235.4 million, will enable significant advances in the Hypersonics, Supersonics, Subsonic Fixed Wing, and Subsonic Rotary Wing projects that make up the Fundamental Aeronautics Program. These projects focus on creating innovative solutions for the technical challenges of the future: increasing performance (range, speed, payload, fuel efficiency) while meeting stringent noise and emissions constraints; alleviating environmental and congestion problems through the use of new aircraft and rotorcraft concepts; and facilitating access to space and re-entry into planetary atmospheres. A wide variety of cross-cutting research topics are being pursued across the speed regimes with emphasis on physics-based multi-disciplinary analysis and design, aerothermodynamics, materials and structures, propulsion, aero-servo-elasticity, thermal protection systems, advanced control methods, and computational and experimental techniques.

The FY 2009 budget request for NASA's Aviation Safety Program is $62.6 million. The four projects within the Program (Integrated Intelligent Flight Deck, Integrated Resilient Aircraft Control, Aircraft Aging and Durability, and Integrated Vehicle Health Management) will develop cutting-edge tools, methods, and technologies with close coordination among them to improve the intrinsic safety attributes of current and future aircraft that will operate in the NextGen. In FY 2009, the Program will demonstrate aircraft engine safety and reliability improvements using advanced sensing technologies and new methods for modeling engine gas flow characteristics. In addition, ballistic tests will be used to study the effect of aging on the impact resiliency of composite fan-blade containment structures for aircraft engines.

Multiple flight and simulation tests will evaluate technologies to protect aircraft during hazardous situations. For example, simulations will evaluate technologies enabling aircraft to land safely even when flight control surfaces are partially damaged or malfunctioning, and flight tests will examine forward-looking, multi-frequency radar systems for early detection of potential hazardous icing.

Finally, NASA's Aeronautics Test Program (ATP) will continue to safeguard the strategic availability of a critical suite of aeronautics test facilities that are deemed necessary to meet Agency and national aeronautics needs. The FY 2009 budget request for the ATP is $73.9 million, which will enable strategic utilization, operations, maintenance, and investment decisions for major wind tunnel/ground test facilities at Ames Research Center in California, Glenn Research Center in Ohio, and Langley Research Center in Virginia, and will support specific aircraft and test bed aircraft at Dryden Flight Research Center, also in California. ARMD has established the National Partnership for Aeronautical Testing with the Department of Defense to pursue a coordinated approach to managing DOD-NASA aeronautical testing facilities. In FY 2009, ATP will continue to reduce the deferred maintenance associated with its facilities and will also invest in new test technologies ensuring a healthy set of facilities and the new capabilities needed for future programs. In addition, ATP plans to continue off-setting the user rates for its facilities through the funding of a portion of the indirect costs resulting in competitive prices. Simultaneously, the Program will continue to move toward a long-term strategic approach that aligns the NASA and DOD facilities to meet future requirements with the right mix of facilities and appropriate investments in facility capability.

Exploration Systems Mission Directorate

In 2007, the Exploration Systems Mission Directorate (ESMD) delivered as promised and will continue to do so in 2008. Major development work is underway; contracts are in place, and our future Exploration plan is executable. By the end of 2008, ESMD will see its first spacecraft launched from the NASA Kennedy Space Center, Florida. This Lunar Reconnaissance Orbiter (LRO) and the Lunar Crater Observation Sensing Satellite (LCROSS) will help NASA scout for potential lunar landing and outpost sites. Additionally, in 2008, NASA will continue to plan how best to transition any needed Shuttle workforce and infrastructure to the Constellation program.

The FY 2009 budget request of $3.5 billion for Exploration will support continued development of new U.S. human spaceflight capabilities and supporting research and technologies, and will enable sustained and affordable human space exploration after the Space Shuttle is retired at the end of FY 2010. The budget request provides stable funding to allow NASA to continue developing our next-generation U.S. human spaceflight vehicles while also providing research and developing technologies for the longer-term development of a sustained human presence on the Moon. Budget stability in FY 2009 is crucial to maintaining a March 2015 Initial Operational Capability for the Orion Crew Exploration Vehicle and Ares I Crew Launch Vehicle. There is minimum flexibility through 2010, so Congressional support for budget stability is critical. Additionally, ESMD will continue to work with other nations and the commercial sector to coordinate planning, leverage investment, and identify opportunities for specific collaboration on lunar data collection and lunar surface activities.

The FY 2009 budget request for Constellation Systems Program is approximately $3.0 billion. The Constellation program includes funding for the Orion and Ares, as well as for ground operations, mission operations, and extravehicular activity projects and a dedicated in-house effort for systems engineering and integration. Last year, the Constellation program made great strides and it will continue to do so in 2008. We have tested real hardware; we have tested landing systems; and we have logged thousands of hours in wind tunnels. So far, NASA engineers have conducted almost 4,000 hours of wind tunnel testing on subscale models of the Ares I to simulate how the current vehicle design performs in flight. These

wind tunnel tests, as well as NASA's first scheduled demonstration test flight for Ares I, known as Ares I-X, are scheduled for spring 2009 and will lay the ground work for maturing the Ares I final design.

Constellation has an integrated schedule and we are meeting our early milestones. In fact, all major elements of the Orion and Ares vehicles were placed under contract by the end of 2007. Currently, NASA has civil servants and contractors on board for the Constellation program serving at all ten Agency Centers, as well as in more than 20 states. In 2008, NASA will continue efforts to define the specific work the Agency's Centers will perform in order to enable astronauts to explore the Moon. Preliminary work assignments covering elements of the Altair human lunar lander and lunar surface operations, as well as the Ares V, were announced in October 2007.

During 2007, ESMD completed a series of key project review milestones, including a System Definition Review for the Orion project in August and for the Ares I project in October. During these reviews, each project examined how its proposed requirements impact engineering decisions for the functional elements of the system. The Orion and Ares I teams are currently assessing design concepts, and are moving toward finalized reference designs that meets their requirements. This reference configuration will be the starting point for the design analysis cycle that leads to Preliminary Design Reviews for the Orion and Ares I projects, in turn leading to an integrated stack review by the end of December 2008. A Preliminary Design Review is a crucial milestone, during which the overall program verifies that the preliminary design meets all requirements within acceptable risk limits and within the cost and schedule constraints.

In FY 2009, NASA is requesting $173 million for the Commercial Crew and Cargo Program and its associated projects. Full funding is essential to maintaining NASA's promised $500 million investment in this program to spur the development of U.S. commercial space transportation services to and from the Space Station, while also providing substantial savings to the taxpayer compared to NASA government-owned and operated capabilities. Technical progress continues to be made by our remaining funded partner, as well by as several of our unfunded partners. NASA plans to sign a Space Act Agreement with a new funded partner in the coming weeks.

The Agency's FY 2009 budget request provides $453 million for activities in ESMD's Advanced Capabilities theme, which seeks ways to reduce the risks for human explorers of the Moon and beyond by conducting research and developing and maturing new technologies. In 2008, NASA's Human Research Program will focus on the highest risks to crew health and performance during exploration missions. We also will develop and validate technologies that serve to reduce medical risks associated with human spaceflight. For example, NASA will continue its work to understand the effect of space radiation on humans and to develop effective mitigation strategies. During 2008, NASA also will continue to research ways to reduce the risks to future explorers. Research onboard Space Station will include human experiments, as well as biological and microgravity experiments. In 2009, the Advanced Capabilities Exploration Technology Development program will conduct a range of activities, including testing prototype ablative heat shield materials; throttleable Lox Hydrogen engines suitable for a human lunar lander; and lightweight life support systems for Orion. The program also will deploy and test advanced environmental monitoring systems on the Space Station to advance the safety of crewmembers, and will continue to test in-situ resource utilization technologies as well as life support and cryogenic fluid management.

In response to Congressional direction contained in the Explanatory Statement accompanying the Consolidated Appropriations Act, 2008 (P.L. 110-161), ESMD will fund in 2008 a robotic lander project managed by NASA's Marshall Space Flight Center in Alabama as a pathfinder for an anticipated network of small science landers based on requirements for NASA's expanded lunar science program. The first lander mission is planned to fly in 2013-2014. NASA's Exploration Systems and Science mission

directorates will continue to work together combining resources to ensure that the goals of the science lander are achieved.

NASA's LRO and the LCROSS have a planned launch later this year from Kennedy Space Center. These dual-manifested spacecraft are in the assembly, integration, and test phase and are making excellent progress toward launch. The knowledge generated by these missions will enable future outpost site selection and new information about resources within the permanently shadowed craters at the lunar poles. The LRO/LCROSS missions represent NASA's first steps in returning to the Moon.

Lastly, facility, infrastructure, property, and personnel transitions from Space Shuttle to Constellation continue to be a major activity. NASA transition activities are focused on managing the evolution from current operations of the Space Shuttle to future operations of Constellation and emerging commercial services, in a safe, successful and smooth process. To date, NASA has met all of its milestones and disposition targets. This joint effort between the Space Operations Mission Directorate and ESMD includes the utilization and disposition of resources, including real and personal property, personnel, and processes, to leverage existing Shuttle and Space Station assets for NASA's future Exploration activities. Formalized Transition Boards are working to successfully achieve this outcome. An initial Human Spaceflight Transition Plan was developed in 2006. An updated NASA Transition Plan, supported by key metrics, is being refined and will be released this year.

Space Operations Mission Directorate

The Space Shuttle and Space Station programs both enjoyed a highly successful and productive year in 2007. The Space Shuttle flew three missions during the year, continuing the assembly of the Station and expanding its capabilities. The June 2007 flight of Atlantis on STS-117 added a truss segment and new solar arrays to the starboard side of the Station to provide increased power. In August, Endeavour brought up another truss segment, supplies, and became the first Orbiter to use a new power transfer system that enables the Space Shuttle to draw power from the Station's solar arrays, extending the duration of the Shuttle's visits to Space Station. On the same mission, STS-118, teacher-turned-astronaut Barbara Morgan conducted a number of education-related activities aboard the Space Station, inspiring students back on Earth and realizing the dream of the Teacher In Space Project for which she and Christa McAuliffe trained more than two decades ago. In October 2007, Discovery flew the STS-120 mission, which added the Harmony node to the Station and featured a spacewalk to disentangle a snagged solar array.

The STS-120 mission paved the way for Station astronauts to conduct a series of ambitious spacewalks and operations using the Station's robotic arm to move the Pressurized Mating Adapter-2 and Harmony node in preparation for the addition of the European Columbus laboratory and the Japanese Kibo laboratory in 2008. These spacewalks are particularly challenging and impressive, as they are carried out entirely by the three-person Expedition crews, without benefit of having a Shuttle Orbiter, with its additional personnel and resources, docked to the Station.

NASA looks forward to upcoming Space Shuttle missions and Space Station Expeditions in 2008, which will feature the delivery, docking, and activation of key scientific assets from two of our International Partners: the European Columbus laboratory, launched just last week aboard Shuttle Atlantis, and the pressurized module of the Japanese Kibo laboratory, to be launched in April. In addition, a major contribution from Canada, the Special Purpose Dextrous Manipulator – or Dextre – will be delivered to the Station, along with the Japanese Experiment Logistics Module, in March. Dextre, the final component of the remote manipulator system provided by Canada, will act as the "hand" on the robotic arm, allowing astronauts to conduct operations and maintenance activities from inside the Space Station,

rather than via spacewalks. In late summer, the crew of STS-125 will become the final Shuttle crew deployed to a non-Station orbit, as they conduct the last Hubble Space Telescope servicing mission from the Space Shuttle. This mission will outfit the telescope with the Cosmic Origins Spectrograph and the Wide-Field Camera 3, as well as replace components to extend Hubble's operational life.

The Space Shuttle FY 2009 budget request of approximately $3.0 billion would provide for four Shuttle flights to support assembly of the Space Station. This would include the flight of the Japanese Kibo laboratory's Exposed Facility, and the delivery of the final Station Truss segment.

The FY 2009 budget request includes about $2.1 billion for ISS International Space Station activities, reflecting the presence of a permanent six-person crew and three major research facilities aboard Station.

After the Space Shuttle retires at the end of FY 2010, NASA will use alternative means to transport cargo and crew to the Space Station. The Agency's first choice for such services is domestic, commercial capability, the development of which is the focus of the Commercial Orbital Transportation Services (COTS) effort. ESMD is funding the first phase of COTS under the Commercial Crew and Cargo Program, which will demonstrate this capability via funded and unfunded Space Act Agreements. SOMD will manage the second phase of the effort, covering actual cargo – and potentially crew – delivery services to the Space Station. Until such time that operational commercial means are available for resupplying the Station, NASA will look to its international partners to provide cargo resupply capability, much of which will be provided as part of the partners' contributions to the International Space Station Program. NASA has contracted with Roscosmos to provide Soyuz and limited cargo services through the end of FY 2011, as permitted under the Iran, North Korea and Syria Non-proliferation Act of 2005 (P.L. 109-112). NASA is monitoring the progress of potential domestic commercial providers to develop cargo and crew transportation services to the Space Station, and the Orion project is on track to reach its Initial Operational Capability in March 2015. The Administration is considering options to maintain a U.S. crew presence aboard the Space Station after the retirement of the Shuttle and before the advent of Orion. Purchasing crew transportation services domestically is NASA's preferred method to meet the needs of the Space Station. Another option may be to seek relief from the provisions of the Iran, North Korea, and Syria Non-Proliferation Act of 2005 for additional Soyuz services to keep a U.S. crew presence on the Space Station until either domestic commercial crew transportation services, or Orion, become available. We will keep the Congress fully informed of our plans.

NASA remains focused on, and committed to, flying out the remaining Space Shuttle missions safely and completing the assembly of the Space Station. Beyond those aims, one of the challenges NASA faces as we approach the end of the Shuttle era is the smooth disposition of personnel and infrastructure. SOMD and ESMD have been working hand-in-hand to ensure that needed skills and facilities are retained and put to productive use during the development and operational phases of the Orion, Ares I, and Ares V projects. In FY 2009, the Agency's transition milestones will include the transfer of Pad 39B and Mobile Launch Platform #1 to Constellation, after the Hubble Servicing Mission. In addition, the Space Shuttle Program is reviewing whether the Space Shuttle Atlantis will be retired in FY 2008 or used to conduct existing missions within the planned manifest.

The Space Flight Support Program's FY 2009 budget request of $733 million would help mitigate outyear costs associated with the Delta II launch pads. The request also reflects the consolidation of the Agency's space communications projects into the Space Communications and Navigation Program. Finally, it includes funding for the development of two satellites to replenish the Tracking and Data Relay Satellite System, planned for launch in 2012 and 2013.

Education

The FY 2009 budget request for Education totals $115.6 million and furthers NASA's commitment to Science, Technology, Engineering, and Mathematics (STEM) education. NASA's primary objectives for Education are to: (1) contribute to the development of the Nation's STEM workforce through a portfolio of initiatives for students at all levels; (2) attract and retain students in STEM disciplines while encouraging them to pursue higher education that is critical to NASA's workforce needs; and (3) engage Americans in NASA's mission through strategic partnerships with STEM education providers.

NASA is committed to ensuring that its future workforce is fully prepared to handle a variety of challenging scientific and technical careers. NASA's Office of Education encourages student interest in STEM through the Agency's missions, workforce, facilities, and innovations in research and technology. The FY 2009 budget request reflects a balanced portfolio of investments which takes into account Congressional priorities, the NASA Strategic Plan, and recommendations from the National Research Council, as well as the priorities of the education community. NASA Education is the critical link between the Agency's scientists and engineers and the education community. NASA Education translates the Agency's missions into educational materials, services, and opportunities for students and learners of all ages. NASA strives to support the role of educational institutions, which provide the framework to unite students, their families, and educators for educational improvement.

In 2008, NASA's Office of Education will continue to collaborate with Agency mission directorates and field Centers to assist educators in promoting scientific and technical literacy while attracting and retaining students in STEM disciplines and careers. NASA Education will also continue its work with other Federal agencies engaged in educational activities, along with public and private partners to leverage the effectiveness and reach of its efforts.

Cross-Agency Support

The FY 2009 budget request for activities within Cross-Agency Support includes funding for developing and maintaining NASA's technical capability including the Agency's vital mission support functions. Cross Agency Support provides a focus for managing technical capability and Agency mission support functions. This budget area consists of three themes: Center Management and Operations; Agency Management and Operations; and, Institutional Investments. Cross Agency Support is not directly identified or aligned to a specific program or project requirement but is necessary to ensure the efficient and effective operation and administration of NASA.

The most significant change is in the area of Agency Management and Operations. Agency Management and Operations provides for the management and oversight of Agency missions and functions and for the performance of many Agency-wide activities. Agency Management and Operations is divided into five programs: Agency Management; Safety and Mission Success; Agency Information Technology services; Innovative Partnerships Program; and, Strategic Capabilities Assets Program.

- The FY 2009 budget request provides $414.6 million for Agency Management which sponsors and supports an executive-based, Agency-level functional and administrative management agenda. Agency Management delivers policies, controls, and oversight across a range of functional and administrative management service areas and also provides for independent technical assessments of Agency programs. It delivers strategic planning services. It assesses and evaluates NASA program and mission performance. It sponsors and directs the Institutions and Management agenda in procurement, human capital, real property and infrastructure, security and program protection, diversity, equal opportunity, and small business. Agency Management also provides for the

operational costs of Headquarters as an installation, including salaries, benefits, training and travel requirements of the Headquarters workforce, as well as the resources necessary to operate the Headquarters installation.

- The FY 2009 budget request provides $163.4 million for Safety and Mission Success activities to provide the critical resources required to strengthen and enable the fundamental and robust cross checks applied on the execution of NASA's mission. The engineering; safety and mission assurance; and health and medical independent oversight and technical authority which are essential to NASA's success and were established in direct response to recommendations of the Challenger and Columbia shuttle accident board recommendations for independent funding of these efforts. The Safety and Mission Success program directly supports NASA's core values and serves to improve the likelihood for safety and mission success for NASA's programs, projects, and operations. Safety and Mission Success includes the corporate work managed by the offices of the Chief Safety and Mission Assurance (including the NASA Safety Center), Chief Engineer (including the NASA Engineering and Safety Center), the Chief Health and Medical Officer, and the Director of the Independent Verification and Validation Facility.

- The FY 2009 budget request for Agency Information Technology services is $163.9 million which encompasses cross-cutting services and initiatives in IT management, applications, and infrastructure necessary to enable the NASA Mission and improve security, integration and efficiency of Agency operations. In FY 2009 significant emphasis will be placed on consolidation of networks and network management, improved security incident detection, response and management, further consolidation of desktop/laptop computer services, data center assessment for consolidation, and application portfolio management leading to consolidation. NASA is using an enterprise architecture approach to assess current assets, capabilities and costs for services and developing requirements, projects and procurements for transition to the desired consolidated state. Additionally, the underlying infrastructure and systems to instill strong authentication and access to information systems in alignment with HSPD-12 will progress significantly in FY 2009. Critical work will continue under the Integrated Enterprise Management Program to improve business processes by minimizing data redundancy, standardizing information and electronic data exchanges, and processing. Also, NASA will continue participation in several federal E-Government initiatives and Lines of Business to improve services to citizens and gain efficiencies across the government.

- The FY 2009 budget request for Innovative Partnerships Program activities is $175.7 million. This program provides leveraged technology investments, dual-use technology-related partnerships, and technology solutions for NASA. This program also facilitates the protection of NASA's rights in its inventions and the transfer of that technology for commercial application and public benefit. In addition, the Innovative Partnerships Program implements NASA's Small Business Innovation Research and Small Business Technology Transfer Programs which seek out high-technology small businesses to address key technology needs for NASA. The program also manages a Seed Fund to address technology needs through cost-shared, joint-development partnerships. The Centennial Challenges Program, which is also managed by the Innovative Partnerships Program, consists of prize contests to stimulate innovation and competition in new technologies for solar system exploration and other NASA mission areas. NASA has already benefited from Centennial Challenge competitions, and last year awarded $450,000 in prize money for the Astronaut Glove Challenge and Personal Air Vehicle Challenge. The Innovative Partnerships Program also transfers NASA technology for public benefit, as documented in NASA's annual "Spinoff" publication. "Spinoff 2007" documented 39 new examples of how NASA innovation has been successfully transferred to the commercial market place and applied to areas such as health and medicine, transportation, public safety, consumer goods, homes and recreation, environmental and agricultural resources, computer technology, and industrial productivity.

- Finally, NASA is requesting $28.0 million in FY 2009 for the Strategic Capabilities Assets Program, a focused activity designed to ensure that critical Agency capabilities and assets for flight simulation, thermal vacuum testing, arc jet testing, and microgravity flight services are available to NASA missions when needed. Strategic Capabilities Assets Program assets are also used by other government agencies, industry, and academia to improve the Nation's position in the global market place as well as its defense capabilities. The Strategic Capabilities Assets Program budget request covers the direct and associated costs required to sustain key test capabilities and assets including operating staff, preventive maintenance, subsystem repairs, and component replacements required to keep the assets in "ready for testing" condition. Incremental costs to conduct specific tests are borne by individual programs and reimbursable customers. The Aeronautics Research Mission Directorate budget request includes $73.9 million for the Aeronautics Test Program (e.g. wind tunnels and flight testing) and the Science Mission Directorate budget request includes $41.9 million for High-End Computing Capability (e.g. the Columbia super computer), which are also managed as Strategic Capabilities Assets. Centralized management at the Agency-level allows NASA to better prioritize and make strategic investment decisions to replace, modify, or disposition these capabilities and assets.

Conclusion

NASA has a lot of hard work ahead, but the Agency continues to make steady progress in managing its challenges. We are deploying our workforce to carry out the great task before us. Last fall, the Agency assigned new leadership roles and responsibilities for exploration and science missions to NASA's ten field Centers across the country in order to help restore the core technical capabilities across the Agency as we transition from the Space Shuttle to new capabilities. I ask your continued help to ensure that this Nation maintains a human spaceflight capability.

In a short span of years, we have already taken long strides in the formulation of strategies and programs that will take us back to the Moon and on to Mars and other destinations in our solar system. Indeed, a generation from now, astronauts on Mars will be flying and living aboard hardware America is funding and designing today, and will be building in the near future. This is a heady legacy to which we can aspire as we develop the next U.S. human space exploration vehicles. The foundation of this legacy will include work we plan to carry out in FY 2009.

As I said earlier in my testimony, NASA is committed to executing the exciting programs and projects within the President's FY 2009 budget request. Having reached a steady state on a balanced set of priorities, we now have a sense of purpose to make steady progress toward achieving our goals for continued leadership in space exploration, scientific discovery, and aeronautics research.

Chairman Gordon, with your support and that of this Committee, we are making the right strategic choices for our Nation's space program. Again, thank you for the opportunity to appear before you today. I would be pleased to respond to any questions that you may have.

National Aeronautics and Space Administration
President's FY 2009 Budget Request Summary

Budget Authority, $ in millions By Appropriation Account By Theme	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Science	**4,609.9**	**4,706.2**	**4,441.5**	**4,482.0**	**4,534.9**	**4,643.4**	**4,761.6**
Earth Science	1,198.5	1,280.3	1,367.5	1,350.7	1,250.9	1,264.4	1,290.3
Planetary Science	1,215.6	1,247.5	1,334.2	1,410.1	1,537.5	1,570.0	1,608.7
Astrophysics	1,365.0	1,337.5	1,162.5	1,122.4	1,057.1	1,067.7	1,116.0
Heliophysics	830.8	840.9	577.3*	598.9	689.4	741.2	746.6
Aeronautics	**593.8**	**511.7**	**446.5**	**447.5**	**452.4**	**456.7**	**467.7**
Exploration	**2,869.8**	**3,143.1**	**3,500.5**	**3,737.7**	**7,048.2**	**7,116.8**	**7,666.8**
Constellation Systems	2,114.7	2,471.9	3,048.2	3,252.8	6,479.5	6,521.4	7,080.5
Advanced Capabilities	755.1	671.1	452.3	484.9	568.7	595.5	586.3
Space Operations	**5,113.5**	**5,526.2**	**5,774.7**	**5,872.8**	**2,900.1**	**3,089.9**	**2,788.5**
Space Shuttle	3,315.3	3,266.7	2,981.7	2,983.7	95.7	-	-
International Space Station	1,469.0	1,813.2	2,060.2	2,277.0	2,176.4	2,448.2	2,143.1
Space and Flight Support	329.2	446.3	732.8*	612.1	628.0	641.7	645.4
Education	**115.9**	**146.8**	**115.6**	**126.1**	**123.8**	**123.8**	**123.8**
Cross-Agency Support	**2,949.9**	**3,242.9**	**3,299.9**	**3,323.9**	**3,363.7**	**3,436.1**	**3,511.3**
Center Management and Operations	1,754.9	2,013.0	2,045.6	2,046.7	2,088.0	2,155.3	2,211.6
Agency Management and Operations	971.2	830.2	945.6	945.5	939.8	950.5	961.3
Institutional Investments	223.8	319.7	308.7	331.7	335.9	330.4	338.3
Congressionally Directed Items	-	80.0	-	-	-	-	-
Inspector General	**32.2**	**32.6**	**35.5**	**36.4**	**37.3**	**38.3**	**39.2**
FY 2008 Rescission**		(192.5)					
NASA FY 2009	**16,285.0**	**17,309.4**	**17,614.2**	**18,026.3**	**18,460.4**	**18,905.0**	**19,358.8**
Year to Year Change		6.3%	1.8%	2.3%	2.4%	2.4%	2.4%

Budgets include all direct costs required to execute the programs. Indirect costs are now budgeted within Cross-Agency Support.

* Deep Space and Near Earth Networks Transfer $256M to SFS in FY 2009.

** FY 2008 Appropriation rescinded $192.475M in prior-year unobligated balances, effectively reducing FY 2008 authority. Not included in totals.

FY 2008 budgets are the enacted levels per the FY 2008 Appropriation as shown in the Agency's FY 2009 Budget Estimates.

Totals may not add due to rounding.