

# REMARKS FOR ADMINISTRATOR BOLDEN

## AERO CLUB LUNCHEON

March 27, 2012

- It's nice to see so many friends and colleagues here this afternoon.
- A little more than a month ago, I had the privilege of unveiling President Obama's \$17.7 billion FY2013 budget request for NASA.
- The NASA budget includes \$4 billion for space operations and \$4 billion for exploration activities in the Human Exploration Operations Mission Directorate, including closeout of the Space Shuttle Program, and funding for the International Space Station (ISS), \$4.9 billion for science, \$669 million for space technology, and \$552 million for aeronautics research.

- This is a stable budget, not a shrinking budget. Some tough decisions had to be made, but I believe we have the right balance to accomplish great things, now and in the future.
- Despite constrained economic times, we have made sustainable choices to provide stability and continuity to existing priority programs and set the pace for opening the next great chapter in exploration
- Under the president's leadership, NASA and the nation are embarking on an ambitious program of space exploration that will build on new technologies as well as proven capabilities as will expand our reach into the solar system, including to new destinations such as an asteroid and Mars.

- When you look at the NASA programmatic budget, you will see that we have a good balance of programs. If you haven't already, I recommend you go to [nasa.gov/budget](https://nasa.gov/budget), which has much greater detail than I could possibly go into for you here today, but I'll try.
- Our human spaceflight budget is focused on operating the International Space Station, bringing the capability of launching American astronauts back to the U.S., and making steady and tangible progress on the next generation deep space crew capsule and rocket.
- More than 400 scientific studies were conducted on Station last year in an array of disciplines, not just those related to human health. This science helps people here on Earth, just as much as it tells us about living in space.

- We've made steady and tangible progress on the next-generation deep space crew capsule, *Orion*, and the Space Launch System, or SLS, our new heavy lift rocket that will launch astronauts on journeys to destinations farther in our solar system. This priority is funded in this budget.
- Already we've been doing test firings of the J-2X engine that will power the heavy lift's upper stage. *Orion* has undergone water drop tests for its eventual ocean landings.
- An exploration flight test of the *Orion* Multi-Purpose Crew Vehicle will take place in 2014, with a follow on integrated MPCV/SLS uncrewed flight in 2017. The inaugural crewed flight of the integrated deep space system will occur as early as 2021.

- This budget supports modernization plans for a 21<sup>st</sup> Century Space Launch Complex to improve capabilities and infrastructure for a low-cost multi-user space transportation facility at the Kennedy Space Center in conjunction with Exploration Ground System efforts for SLS and *Orion*.
- I am committed to launching astronauts from American soil, on spacecraft built by American companies. This budget provides the funding needed to bring our human space launches back home to the U.S. and get American companies transporting our astronauts once again.
- In FY 2013, NASA plans for at least three flights delivering research and logistics hardware to the ISS by U.S.-developed cargo delivery systems.

- Just last month we issued an announcement for proposals for the next round of commercial crew development work. We're asking industry innovators to submit proposals in the Commercial Crew Integrated Capability Initiative that will lead to Space Act Agreements that will help NASA and the U.S. achieve safe, reliable, and cost effective human access to space.
- Later this year we'll have the first ever launch and berthing of a spacecraft to the ISS by a private company. That is a critical and historic milestone.
- Now, let's talk about Science. Despite what you may have heard, NASA's science budget is strong. However, we did have to make tough choices. As a result, we will not be moving forward with the planned 2016 and 2018 ExoMars missions that we had been exploring with the European Space Agency.

- Instead, we will develop an integrated strategy to ensure that the next steps for Mars exploration will support science as well as human exploration goals, and potentially take advantage of the 2018-2020 exploration window.
- I have asked Dr. John Grunsfeld, the new head of our Science Mission Directorate, to lead team that will craft this integrated Mars strategy.
- The budget provides support for this new approach, and this process will be informed by extensive coordination with the science community and our international partners.

- This budget also supports more than 80 science missions – 56 currently in operation and 28 now under development -- that cover the vital data we need to understand our own planet; enhance exploration farther into our solar system; and support the next generation of observatories peering beyond the reaches of our neighborhood to other galaxies and their solar systems and undiscovered phenomena.
- This coming August, we will land *Curiosity*, the largest rover ever, on Mars. We'll also continue to develop and conduct critical tests on the James Webb Space Telescope leading to its planned launch in 2018. As the successor to the Hubble Space Telescope, Webb will allow us to continue to revolutionize our understanding of the universe.

- Among many other science priorities, this budget also supports:
  - Completion and launch of the Landsat Data Continuity Mission and Global Precipitation Mission.
  - Continued development of Orbiting Carbon Observatory-2 (OCO-2), which is crucial to our understanding of the Earth's carbon cycle and its effect on the Earth's climate.
  - Continued work toward *LADEE* and *MAVEN* launches in calendar year 2013.
  - Science missions on the Stratospheric Observatory for Infrared Astronomy (*SOFIA*), and instruments for Japan's Astro-H mission.
  - The next Astrophysics Explorer mission, which we plan to select in 2013.
  - Sixteen Heliophysics missions and work toward a 2015 launch of the strategic Magnetospheric Multiscale mission, which will help us understand space weather.

- In aeronautics, maybe the area in which you're most interested, our investments are driving technology breakthroughs for cleaner, safer, and more efficient aircraft and accelerating the nation's transition to the Next Generation Air Transportation System (NextGen).
- The millions of air travelers around the world will benefit from our work and our partnership with the greater aviation community to transform our air travel system through investments in revolutionary concepts for air vehicles and air traffic management.
- This budget also continues support for the integration of unmanned aircraft systems into the National Airspace System and the validation of complex aviation systems.

- NASA funded three industry/academia teams to explore new vehicle concepts that could help us achieve our goals and enter into commercial service in 2025 (two generations after the current state of the art aircraft). The teams created technology development roadmaps and identified critical technology demonstrations necessary to make those aircraft a reality.
- The results of these studies, released in January 2012, validate NASA's aggressive vision for the future of civil aviation, and are helping NASA and industry to prioritize research investments to make that vision a reality.
- NASA's partnership with the Federal Aviation Administration (FAA) and the broader aviation community to accelerate the implementation of NextGen is yielding results.

- Over the last few months we have handed off to the FAA two new suites of air traffic management concepts that can help make NextGen a reality.
- Through teams made up of experts from government, industry and academia, we are identifying, developing, testing and handing off to the FAA new concepts and technology needed for NextGen. These new tools show the promise of saving millions of dollars in wasted fuel, reducing controller workload or significantly increasing the capacity of our airspace, all without compromising safety – and we have more in the pipeline under development.
- NASA also is helping airlines and the FAA to understand the effect that alternative fuels and biofuels have on the operation of jet engines, and what burning these fuels does to the environment.

- NASA researchers investigated for the first time the impact on airport local air quality of jet engines burning renewable biofuels and found large reductions in the output of harmful small particulates compared to burning today's jet fuel.
- Building on those successes, in FY13 we plan to perform ground and flight tests with standard jet fuel and alternative fuel blends to understand and measure contrail formation, as well as measure gaseous and particulate emissions in the atmosphere. These tests will give us insight into how altitude and alternative fuels affect engine emissions, and determine if alternative fuels affect the formation of contrails or their properties.

- Better understanding the impact of alternative fuels and validated test methodologies could enable the widespread use of alternatives to fossil fuels in aviation as these fuels become more readily available and cost competitive with conventional jet engine fuels.
- I want to point out that this year's Green Aviation Challenge winner was an electric plane.
- NASA is also tackling a unique safety issue involving a mysterious form of engine icing caused by ice crystals at high altitudes in certain kinds of weather and lead to engine power loss, flameouts or damage.

- Using research aircraft equipped with unique instruments, NASA and partners will conduct a trial flight campaign in 2012, and a full flight campaign in 2013, to understand when and where these ice crystals form and how large and numerous they are. We then will conduct first-of-their-kind engine ground tests and simulations in recently upgraded test facilities that can re-create the ice crystal characteristics measured during the flight campaigns to finally identify the causes of this phenomenon.
- NASA research results will help the FAA to develop new safety rules related to engine icing, and help aircraft and engine manufacturers to meet those new rules, enhancing safety while improving the bottom line. I visited a facility at the Glenn Research Center in Cleveland where they are going to be studying the phenomena, and it was fascinating.

- This is just a sampling of some of the cool things we're doing in aeronautics which, again, are likely to have a big impact on a wide range of people worldwide.
- On the space technology front, we are driving advances and developing and maturing broadly applicable technology in areas such as: in-space propulsion, robotics, space power systems, deep-space communications, cryogenic fluid handling, and entry, descent, and landing, which are essential for exploration beyond low Earth orbit.
- In fact, that Mars rover that lands in August is going to demonstrate precision landing technology and help us reach an area that would have been previously inaccessible.

- Our 2013 budget also supports more projects like the three technology demonstration mission proposals we selected this past year to transform space laser communications, deep space navigation using atomic clocks, and in-space propulsion capabilities, including solar sails.
- It's always a pleasure to talk to the students who are studying right now to be tomorrow's exploration leaders.
- This year, we're continuing to develop and inspire the next generation of explorers through science, technology, engineering, and mathematics, or STEM, education activities throughout NASA's programs.

- We're focusing our limited resources on programs with measurable results, things like competitive opportunities for learners and educators and experiential opportunities, internships, and scholarships for high school and undergraduate students. Our Chief Technologist's office last year provided 80 space technology research fellowships to graduate students to complete their studies and join us in tomorrow's missions.
- At its core, NASA remains about American innovation and American ingenuity. We're keeping the U.S. the world leader in space exploration and showcasing our knack for solving problems and improving life here on Earth.
- In this time of national fiscal austerity, NASA has accepted the challenge to manage to a flat out-year top-line budget.

- It's going to be an amazing ride!
- There's a strong ferment of innovation out there right now in the aerospace field – an energy of people ready to leap into the next great chapter of exploration and all the benefits it will bring us here on Earth.
- The future is literally happening right now. We at NASA intend to be leading in the march to that future and I hope many of you will choose to join us in this fantastic journey.