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## NASA Names Top Stories For 2011

December 21, 2011



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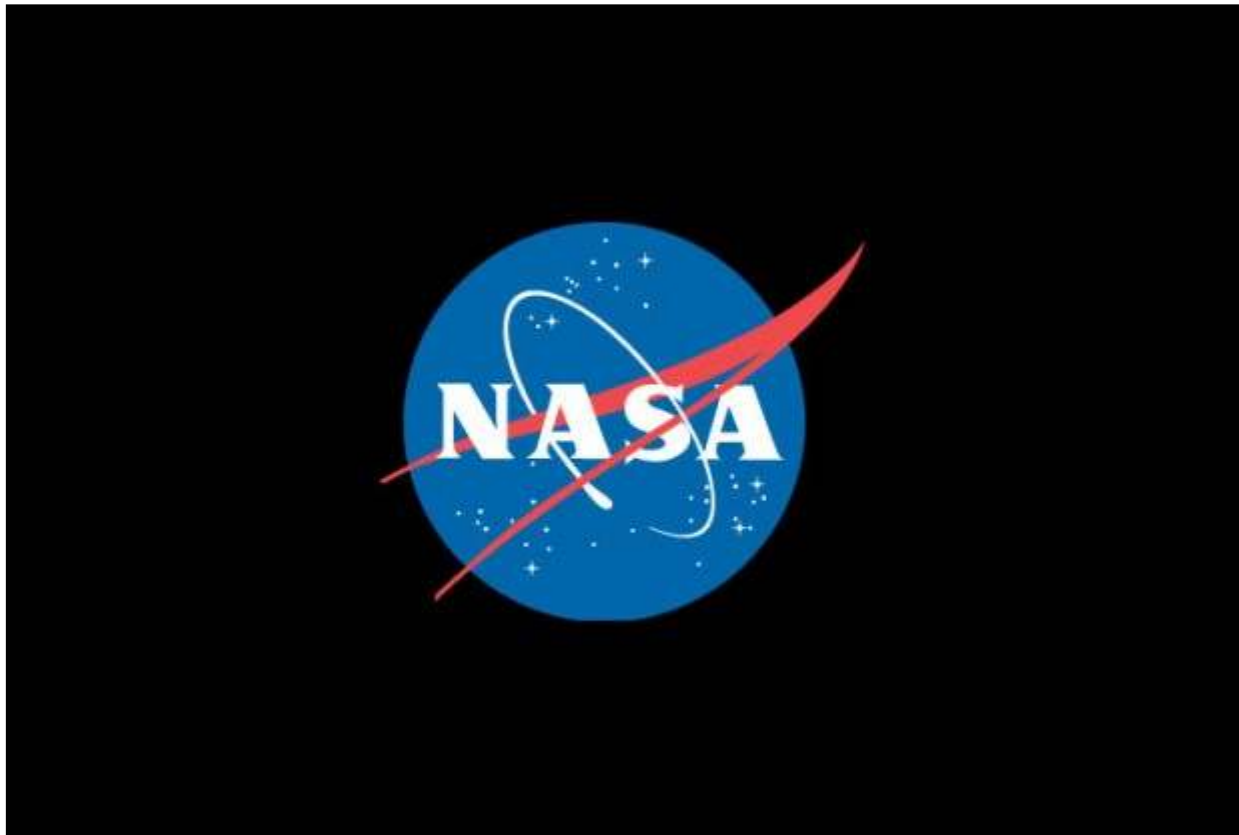
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### **NASA Announces Plans for Human Exploration of Deep Space, Fosters Commercial Spaceflight and Makes Major Discoveries in 2011**

In 2011, NASA began developing a heavy-lift rocket for the human exploration of deep space, helped foster a new era of commercial spaceflight and technology breakthroughs, fully utilized a newly complete space station, and made major discoveries about the universe we live in, many of which will benefit life on Earth.

“The year truly marks the beginning of a new era in the human exploration of our solar system,” NASA Administrator Charles Bolden said. “Just as important are the ground-breaking discoveries about Earth and the universe, as well as our work to inspire and educate a new generation of scientists and engineers, and our efforts to keep the agency on a firm financial footing with its first clean audit in nine years. It’s been a landmark year for the entire NASA team.”

The following are some of NASA’s top stories for the past calendar year:

### **NASA DECIDES ARCHITECTURE FOR FUTURE HUMAN DEEP SPACE EXPLORATION**

NASA reached several milestones in developing a new U.S. space transportation system that will serve as the cornerstone for America’s future human space exploration efforts. The first decision came in late May, when NASA Administrator Bolden selected the Orion Crew Exploration Vehicle as the spacecraft that would take astronauts beyond low Earth orbit. In addition to exceeding the requirements necessary for deep space travel, it was consistent with the NASA Authorization Act of 2010 to retain as much of the current workforce and its critical skills as possible. In September, Bolden announced the design of a new Space Launch System — a heavy-lift rocket that will take our astronauts farther into space than ever before, create high-quality jobs here at home, and provide the cornerstone for America’s future human space exploration efforts.

In November, NASA announced it planned to add an uncrewed flight test of the Orion spacecraft in early 2014 to its contract with Lockheed Martin Space Systems. The Exploration Flight Test, or EFT-1, will fly two orbits to a high-apogee and make a high-energy re-entry through Earth’s atmosphere. Orion will land off the California coast and be recovered using operations planned for future human exploration missions. Throughout the year, engineers conducted multiple test firings of the agency’s J-2X engines at NASA’s Stennis Space Center in Mississippi and performed several Orion water drop tests at NASA’s Langley Research Center in Virginia. In September, NASA and ATK Space Systems successfully completed a two-minute, full-scale test of Development Motor-3, the agency’s largest and most powerful solid rocket motor ever designed for flight. <http://www.nasa.gov/exploration>

### **COMMERCIAL SPACE EFFORTS ACCELERATE**

NASA awarded four Space Act Agreements worth \$269.3 million in the second round of the agency’s Commercial Crew Development effort in April. Each company received between \$22 million and \$92.3 million to advance commercial crew space transportation system concepts and mature the design and development of systems elements, such as launch vehicles and spacecraft. The four companies, Blue Origin in Kent, Wash., Sierra Nevada Corporation in Louisville, Colo., Space Exploration Technologies in Hawthorne, Calif., and The Boeing Company in Houston, are working to accelerate the availability of U.S. commercial crew transportation to the International Space Station and reduce the gap in American human spaceflight capability. This activity is expected to spur economic growth as potential new markets are created. Crew transportation capabilities then could become available to commercial and government customers.

All of NASA’s commercial partners are meeting established milestones. NASA program managers also signed several unfunded Space Act Agreements with commercial partners during the year. In July, NASA and United Launch Alliance (ULA) managers agreed to work together on the Atlas V, a flight-proven expendable launch vehicle used for critical space missions. The agency agreed to share its human spaceflight experience and human certification requirements with ULA to advance its crew transportation system capabilities. ULA will provide feedback to NASA about those requirements, including input on the technical feasibility and cost effectiveness of NASA’s proposed certification approach. In September, NASA and Alliant Techsystems agreed to collaborate on the development of the company’s Liberty Launch System. The agreement enables the two parties to review and discuss Liberty system requirements, safety and certification plans, computational models of rocket stage performance and avionics architecture designs. September also marked the release of a draft request for proposals outlining a complete end-to-end transportation system design, including spacecraft, launch vehicles, launch

services, ground and mission operations and recovery. The Integrated Design Contract of up to \$1.61 billion is scheduled to run from July 2012 through April 2014. In December, NASA announced a modified approach for supporting commercial crew capability. The agency will competitively award Space Act agreements for the next phase of the Commercial Crew Program instead of awarding contracts. The move will keep on track the agency's plan for U.S. companies to transport astronauts into space and ultimately will end outsourcing the work to foreign governments. <http://www.nasa.gov/offices/c3po/home>

### **INTERNATIONAL SPACE STATION SHIFTS TO UTILIZATION AND RESEARCH**

NASA and its international partners celebrated 11 years of permanent human habitation on the International Space Station on Nov. 2. More than 1,400 research and technology development experiments have been conducted aboard the orbiting lab, many of which are producing advances in medicine, environmental systems and our understanding of the universe. NASA selected an independent non-profit organization, the Center for the Advancement of Science in Space (CASIS), to manage U.S. scientific and technological research conducted through the part of ISS that is a National Laboratory, and is transitioning responsibilities to CASIS. Robonaut 2, the first humanoid robot in space, and the Robotics Refueling Mission (RRM), which tests robotic techniques for on-orbit satellite servicing, were delivered to the station in 2011. In preparation for the first commercial resupply missions to ISS in 2012, NASA has been working closely with SpaceX and Orbital Science Corp. of Dulles, Va., to ensure the Dragon and Cygnus cargo vehicles' designs and operations are compatible with the station. Integration activities include verification of physical and operational interfaces, safety assessments, joint software testing, operations planning, crew training and mission simulations. This year, NASA graduated the astronaut class of 2009 and, on Nov. 15, began recruiting its next astronaut class. These new astronauts will advance research aboard the space station to benefit life on Earth and develop the knowledge and skills needed for longer flights to explore the solar system. Those selected also will be among the first to pioneer a new generation of commercial launch vehicles and travel aboard a new heavy-lift rocket to distant destinations in deep space. Qualified individuals can apply to become an astronaut through the federal government's USAJobs.gov website. <http://www.nasa.gov/station>

### **SPACE SHUTTLE FLIES FINAL THREE FLIGHTS, PROGRAM ENDS**

NASA's Space Shuttle Program concluded in 2011 with three final missions to the International Space Station. Each mission carried supplies and equipment that will sustain the space station crews until NASA's new Commercial Resupply Service providers take over this role.

Shuttle Discovery launched the STS-133 mission on Feb. 24, carrying the retrofitted, Italian-built multipurpose logistics module (MPLM) "Leonardo" to the space station. On May 16, Endeavour launched STS-134 and, along with supplies and equipment, brought the Alpha Magnetic Spectrometer-2 (AMS) to the space station. The AMS is a particle physics experiment module designed to search for unusual matter by measuring cosmic rays. STS-135 launched on July 8, making the space shuttles' final delivery of supplies to the space station. Just before returning to Earth, STS-135 Commander Chris Ferguson presented the station's crew with a U.S. flag flown on the first space shuttle mission, STS-1, in April 1981. The flag will remain displayed aboard the station until the next crew launched from the U.S. retrieves it for return to Earth so it can be carried by the first crew launched from the U.S. on a journey of exploration beyond low-Earth orbit. <http://www.nasa.gov/shuttle>

### **CHIEF TECHNOLOGIST RAMPS UP SPACE TECHNOLOGY PROGRAM**

NASA's Office of the Chief Technologist and the agency's newly created Space Technology Program moved from formulation to implementation in 2011. The Space Technology Program is investing in transformation technologies to improve NASA's capabilities, while reducing cost and expanding the reach of future aeronautics, science and exploration missions. The program has more than 1,000 projects underway, almost all of which were competitively selected, ranging across all technical areas and all levels of technical maturity. The first Technology Development

Mission, the Mars Science Laboratory Entry, Descent, and Landing Instrument (MEDLI) Suite, launched with the Mars Science Laboratory in November. In addition, NASA spinoff technologies have created thousands of jobs and revenue while significantly improving the quality of life for millions of people. In September, NASA awarded \$1.5 million in prizes for hyper-efficient aircraft at the Green Flight Challenge, heralding a new industry for electric aircraft. <http://www.nasa.gov/oct> and <http://www.nasa.gov/spinoffs> and <http://www.nasa.gov/challenges>

### **NASA AWARDS TECHNOLOGY SCHOLARSHIPS TO EDUCATE THE NEXT GENERATION OF SPACE TECHNOLOGISTS**

NASA's Office of the Chief Technologist selected the inaugural class of 80 highly qualified and talented graduate students from 37 universities and colleges last summer to receive fellowships. The students will pursue master's or doctoral degrees in relevant space technology disciplines at their respective institutions. This first class of Space Technology Fellows is part of NASA's strategy to develop the technological foundation for its future science and exploration missions. The program's goal is to provide the nation with a pipeline of highly skilled engineers and technologists to improve U.S. competitiveness. [http://www.nasa.gov/home/hqnews/2011/jul/HQ\\_11-246\\_STRF\\_Awards.html](http://www.nasa.gov/home/hqnews/2011/jul/HQ_11-246_STRF_Awards.html)

### **NASA SPACECRAFT CONTINUE MAKING MAJOR DISCOVERIES ON MARS**

NASA missions continued their ground-breaking research on the Red Planet in 2011. These discoveries will help lay the foundation for future human missions to Mars. NASA's Mars Reconnaissance Orbiter revealed possible flowing water during the planet's warmest months. Dark, finger-like features appear and extend down some Martian slopes during late spring through summer, fade in winter, and return the next spring. Repeated observations tracked the seasonal changes in these recurring features on several steep slopes in the middle latitudes of Mars' southern hemisphere. Scientists' best explanation for these observations is the flow of briny water. Some aspects of the observations still puzzle researchers, but flows of liquid brine fit the features' characteristics better than alternate hypotheses. These results are the closest scientists have come to finding evidence of liquid water on the planet's surface today.

NASA's Mars Exploration Rover program continued to make news in 2011. The Opportunity rover found bright veins of a mineral, apparently gypsum, deposited by water, near the rim of Endeavour crater. Analysis of the vein will help improve understanding of the history of wet environments on Mars. NASA's newest Mars explorer, the Mars Science Laboratory spacecraft, which includes the car-sized Curiosity rover, launched aboard an Atlas V rocket on Nov. 26 to begin an eight-month journey to the Red Planet's Gale Crater. The rover will search for signs that the planet could ever have been hospitable to life. <http://www.nasa.gov/mars>

### **AQUARIUS YIELDS NASA'S FIRST GLOBAL MAP OF OCEAN SALINITY**

NASA's new Aquarius instrument, launched into Earth orbit on June 10, produced its first global map of the salinity of the ocean surface. Surface salinity is the last of the major ocean surface quantities to be measured globally from space and provides scientists with a new tool to explore the connections between global rainfall, ocean currents and climate changes. Aquarius is now producing continuous observations of the global oceans in unprecedented detail, including extensive low-salinity regions associated with the outflow of major rivers. The instrument was launched on the Aquarius/SAC-D observatory, a collaboration between NASA and Argentina's space agency, Comision Nacional de Actividades Espaciales, with participation by five other nations. <http://www.nasa.gov/aquarius>

### **TWIN SOLAR SPACECRAFT TAKE FIRST COMPLETE IMAGE OF FAR SIDE OF SUN**

The Solar Terrestrial Relations Observatory (STEREO) spacecraft captured the first entire view of the far side of the sun in June. These first-ever views will advance the study of solar and space physics, help validate previous

imaging techniques, and contribute to the accuracy and timeliness of space weather forecasts. The spacecraft reached opposite sides of the sun in February, but a small part of the sun was inaccessible to their combined view until June. [http://www.nasa.gov/mission\\_pages/stereo/news/farside-060111.html](http://www.nasa.gov/mission_pages/stereo/news/farside-060111.html)

### **YEAR OF THE SOLAR SYSTEM FOR NASA PLANETARY MISSIONS**

NASA's Year of the Solar System resulted in three planetary launches, major science observations, an asteroid rendezvous, and a comet flyby. In February, Stardust-NExT provided the first-ever opportunity to compare observations of a single comet, Tempel 1, made at close range during two successive passages. In March, the Mercury Surface, Space Environment, Geochemistry, and Ranging, or MESSENGER, spacecraft became the first spacecraft inserted into orbit around Mercury, our solar system's innermost planet. The mission is currently providing unprecedented images of that planet's topography and improved understanding of its core and magnetic field. In July, the Dawn spacecraft began orbiting the asteroid Vesta and obtained never-before-seen close-up observations of the second largest asteroid in our asteroid belt. In August, the Juno spacecraft was launched on a mission to Jupiter to map the depths of the planet's interior and learn how the gas giant was formed. It will reach Jupiter in 2016. The Gravity Recovery and Interior Laboratory, or GRAIL, lifted off in September to study the moon from crust to core. And in November, the Mars Science Laboratory was launched on its voyage to the Red Planet with Curiosity, the largest planetary rover ever developed, and the first astrobiology mission since the Viking landers in the 1970's. <http://www.nasa.gov/topics/solarsystem/>

### **VOYAGER PROBES SUGGEST MAGNETIC BUBBLES AT SOLAR SYSTEM EDGE**

Observations from NASA's Voyager spacecraft, humanity's farthest deep space sentinels, suggest the edge of our solar system may not be smooth, but filled with a turbulent sea of magnetic bubbles. Using a new computer model to analyze Voyager data, scientists found the sun's distant magnetic field is made up of bubbles approximately 100 million miles wide. The bubbles are created when magnetic field lines reorganize. The Voyager spacecraft, more than 9 billion miles away from Earth, are traveling in a boundary region where the solar wind and magnetic field are affected by material expelled from other stars in our corner of the Milky Way galaxy. Understanding the structure of the sun's magnetic field will allow scientists to explain how galactic cosmic rays enter our solar system and help determine how the star interacts with the rest of the galaxy. <http://www.nasa.gov/voyager>

### **NASA TELESCOPES JOIN FORCES TO OBSERVE BLACK-HOLE-DEVOURING STAR**

NASA's Swift satellite, Hubble Space Telescope and Chandra X-ray Observatory teamed up to study one of the most puzzling cosmic blasts ever observed. Astronomers never before had seen such a bright, variable, high-energy, long-lasting burst. Usually, gamma-ray bursts mark the destruction of a massive star, and emissions from these events last no more than a few hours. Astronomers soon realized the source, known as Swift J1644+57, was the result of a truly extraordinary event — the awakening of a distant galaxy's dormant black hole as it shredded and consumed a star. The galaxy is so far away, it took the light from the event approximately 3.9 billion years to reach Earth. <http://go.nasa.gov/vcO6WS> and <http://go.nasa.gov/rTZes3>

### **KEPLER CONFIRMS ITS FIRST PLANET IN HABITABLE ZONE OF SUN-LIKE STAR AND FIRST EARTH-SIZE PLANETS BEYOND OUR SOLAR SYSTEM**

In 2011, NASA's Kepler mission confirmed its first planet in the habitable zone, the region where liquid water could exist on a planet's surface. Kepler also discovered more than 1,000 new planet candidates, nearly doubling its previously known count to 2,326. Ten of these candidates are near-Earth-size and orbit in the habitable zone of their host star. The newly confirmed planet, Kepler-22b, is the smallest yet found to orbit in the middle of the habitable zone of a star similar to our sun. The planet is about 2.4 times the radius of Earth and located 600 light-years away. Scientists don't yet know if Kepler-22b has a predominantly rocky, gaseous or liquid composition, but its discovery is

a step closer to finding Earth-like planets. While the planet is larger than Earth, its orbit of 290 days around a sun-like star resembles that of our world. The planet's host star belongs to the same class as our sun, called G-type, although it is slightly smaller and cooler. Kepler mission also discovered the first Earth-size planets orbiting a sun-like star outside our solar system. The planets, called Kepler-20e and Kepler-20f, are too close to their star to be in the habitable zone, but they are the smallest exoplanets ever confirmed around a star like our sun.

<http://kepler.nasa.gov/>

### **AERONAUTICS RESEARCH PAVES WAY FOR FUTURE AIR TRAVEL**

NASA's aeronautical innovators continued in 2011 to lay the foundation for the future of flight by exploring new ways to manage air traffic, build more fuel-efficient and environmentally friendly airliners, and ensure aviation's outstanding safety record. 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. NASA aeronautics researchers also developed new concepts for efficiently routing airliners around bad weather, which accounts for 70 percent of all air traffic delays each year. New sophisticated computer algorithms developed by NASA are also providing airlines with the capability to sift through millions of pieces of information collected from flights each day to identify maintenance or operational issues long before they lead to incidents or accidents. <http://www.nasa.gov/topics/aeronautics>

### **NASA BUILDS ON AWARD-WINNING ONLINE MEDIA EFFORTS**

NASA's website, [www.nasa.gov](http://www.nasa.gov), received its third-consecutive Webby Award (and fourth overall) for best government website. The site served a record number of visitors, more than 140 million, and received record-high customer satisfaction ratings as well. Visitors downloaded more than 652 million web pages and 27 million video clips. They shared NASA content via Facebook and other services 246,000 times. The launch of STS-135 became the biggest online event in NASA history, serving up more than 560,000 live streams of NASA TV for the launch. The agency also began streaming to iPhones, iPads and Android phones, recognizing the public's increasing use of mobile devices.

In 2011, NASA expanded its engagement with the public and social media presence. People now can find NASA, the agency's centers, programs and projects on more than 250 locations across Twitter, Facebook, Flickr, Foursquare, Google+, YouTube, UStream and SlideShare. The agency's flagship Twitter account, @NASA, now has more than 1.6 million followers, and astronauts aboard the International Space Station have maintained a connection to Earthlings via their Twitter accounts. NASA astronaut Doug Wheelock was honored with a Shorty Award for an image of the moon he took and posted to his Twitter account, @Astro\_Wheels, while living aboard the International Space Station in 2010. Wheelock's "Moon from Space" image was selected as the best Real-Time Photo of the Year. The agency invited more than 1,600 of its Twitter followers to experience NASA behind-the-scenes at 17 different Tweetups held across the agency on various topics. Participants interacted with NASA scientists, engineers and leaders at the events, viewed the final three space shuttle launches and four launches of science spacecraft, and visited NASA Headquarters and seven different field centers. Find all the ways to connect and collaborate with NASA at: <http://www.nasa.gov/connect>

### **NASA EDUCATION OFFICE ENGAGES STUDENTS IN SCIENCE AND MATH**

NASA's Office of Education successfully developed a variety of new partnerships and engaged in a number of activities to promote science, technology, engineering and math education. In March, the office collaborated with Donna Karan's Urban Zen Foundation and Mary J. Blige's Foundation for the Advancement of Women Now to inspire underserved youth in New York City. The outreach program aligned with a White House initiative designed to engage women and girls in STEM studies. NASA Education's 2011 Summer of Innovation program reached more than 46,000 middle school students in 46 states, plus the District of Columbia and Puerto Rico. The program also

provided professional development for more than 2,700 middle school teachers nationwide. At the launch of the

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