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THE YEAR IN REVIEW

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Space exploration

Human spaceflight activities moved in a new direction in 2010, a year marked by both continued progress in exploration systems and uncertainty about the future.

The 2009 Review of U.S. Human Space Flight Plans Committee, which was commissioned by President Barack Obama, determined that the Constellation program could not be executed within the available budget and recommended that NASA pursue a “flexible path” strategy for human exploration. Under this new strategy, human missions would be sent to progressively more distant destinations, such as Lagrange points, near Earth asteroids, and the moons of Mars, before attempting to land on either the Moon or Mars. By first demonstrating the critical capabilities needed for deep space missions, and by deferring the development of landing and surface systems, costs can be spread out in time to fit within the available budget.

In February, the president’s FY11 budget request for NASA incorporated many of the recommendations of this committee in plans for several new technology programs. These programs would seek to demonstrate key capabilities for human deep space exploration and would place a new emphasis on developing commercial rockets to transport crews into orbit after the space shuttle is retired. The new technology programs would develop liquid-fueled rocket engines for heavy-lift launchers. They would also demonstrate automated rendezvous and docking, cryogenic propellant storage and transfer, a solar electric transfer vehicle, and habitation systems in spaceflight experiments. Plans also include a series of robotic precursor missions to scout potential destinations for future human activity.

On April 15 the president set a new goal for NASA: sending a human mission to a near-Earth asteroid by 2025. The primary objectives for an asteroid mission would be to test technologies and operational concepts for deep space missions, return samples to increase our understanding of the solar system’s formation and evolution, and determine if asteroids can be deflected to prevent them from colliding with Earth.

Meanwhile, the Constellation program continued to make progress despite its uncertain future. On May 6 the first integrated test of the launch abort system for the Orion crew exploration vehicle was successfully conducted at White Sands Missile Range. On August 31



The Pad Abort 1 test of the Orion launch abort system took place successfully at White Sands Missile Range.

ATK test fired a five-segment solid rocket motor for Ares I to demonstrate operation at cold temperatures. A ground test article of the Orion capsule was fabricated and tested at proof pressure. The Constellation program also completed its preliminary design review.

Plans to develop commercial rockets for launching crew and cargo into LEO were given a boost by the successful launch of the Space-X Falcon 9 vehicle on June 4. NASA awarded contracts to begin development of concepts and technologies for commercial crew launch.

In September, the Lunar Reconnaissance Orbiter (LRO) completed its one-year mission to map the Moon and identify potential landing sites and resources for future human missions. LRO’s seven instruments have returned over 100 terabytes of data. The orbiter’s major accomplishments include finding the coldest spot in the solar system in shadowed craters at the lunar poles, mapping the distribution of hydrogen, acquiring high-resolution images of the Apollo landing sites, and producing a global topographic map with its laser altimeter. The mission will be extended for two more years for lunar science studies.

Two crewed rovers, a large payload transport rover, and a habitat unit were tested in the Arizona desert to simulate operational scenarios for planetary surface exploration. Robonaut 2 was launched to ISS in November to assist the crew in performing tasks.

The year closes with Congress having passed the NASA Authorization Act of 2010, which directs NASA to begin a new heavy-lift launch vehicle program and continue the development of a crew exploration vehicle in 2011. 

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