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AEROSPACE

A M E R I C A

2015

NASA mosaic of
#PlutoTime photos

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This was a banner year for solar-system exploration with missions to two dwarf planets and a comet.

After traveling for 10 years and three billion miles, the New Horizons spacecraft's historic **flyby of Pluto** on July 14 completed an initial survey of all planets in the solar system. New Horizons captured spectacular images of mountain ranges and frozen plains on Pluto's surface, and of its five known moons.

After leaving the asteroid Vesta in 2012, the Dawn mission entered orbit around the dwarf planet Ceres and discovered several bright spots of unknown origin. In August, the European Space Agency's Rosetta mission watched **Comet 67P/Churyumov-Gerasimenko** release streamers of gas as it warmed during its approach to perihelion. Intermittent contact was reestablished with the wayward Philae lander.

The Kepler spacecraft discovered its 1,000th confirmed extra-solar planet, including a planet 60 percent larger than Earth that orbits within the habitable zone of a Sun-like star. This planet, called Kepler-452b, is 1.5 billion years older than Earth.

In human space exploration, American astronaut **Scott Kelly** and Russian cosmonaut **Mikhail Kornienko** were launched to the International Space Station in March to begin a one-year mission to investigate the medical and psychological effects of long-duration spaceflight on the crew's health and performance. The knowledge gained from this mission will help NASA develop plans for sending humans to Mars on missions lasting more than 1,000 days.

Development on NASA's Space Launch System continued its progress. Several tests

of the RS-25 engine that will power the SLS were conducted at Stennis Space Center. A five-segment solid rocket booster was also tested in Utah. The critical design reviews for both SLS and Orion were completed in October.

SpaceX conducted a successful pad abort test of their Dragon capsule for NASA's Commercial Crew Program. In June, a SpaceX Falcon 9 rocket failed during launch on a mission to resupply the ISS. **Blue Origins** launched its New Shepard rocket on its first suborbital flight test, reaching an altitude of over 300,000 feet.

NASA decided to pursue a mission concept for its Asteroid Redirect Mission that will use a robotic spacecraft to capture a boulder from the surface of a near-Earth asteroid and place the boulder into a stable lunar orbit for exploration by astronauts. ARM will also test techniques for deflecting the asteroid to demonstrate planetary defense capabilities. Work

is progressing on development of the solar electric propulsion system, rendezvous sensors, and autonomous robotic manipulators for the mission.

In space exploration technology, **Bigelow Aerospace** delivered an inflatable module for launch to ISS. Deployment and structural integrity of the module will be demonstrated during its two-year mission on ISS to aid in the design of future

deep space habitats. NASA conducted a second test of a low-density supersonic decelerator for landing heavier payloads on Mars. The test vehicle was dropped from a high altitude balloon, but the supersonic parachute failed during deployment. NASA also completed human-in-the-loop testing of a portable life support system for an advanced space suit.

Solar-system exploration marks banner year

by Chris Moore

The Space Exploration Program Committee brings together experts on topics relevant to future human and robotic exploration missions.



Pluto, as seen through blue, red, and infrared images taken on July 14 by Ralph, a multispectral imaging camera aboard NASA's New Horizons spacecraft.

NASA/Johns Hopkins University
Applied Physics Laboratory/
Southwest Research Institute