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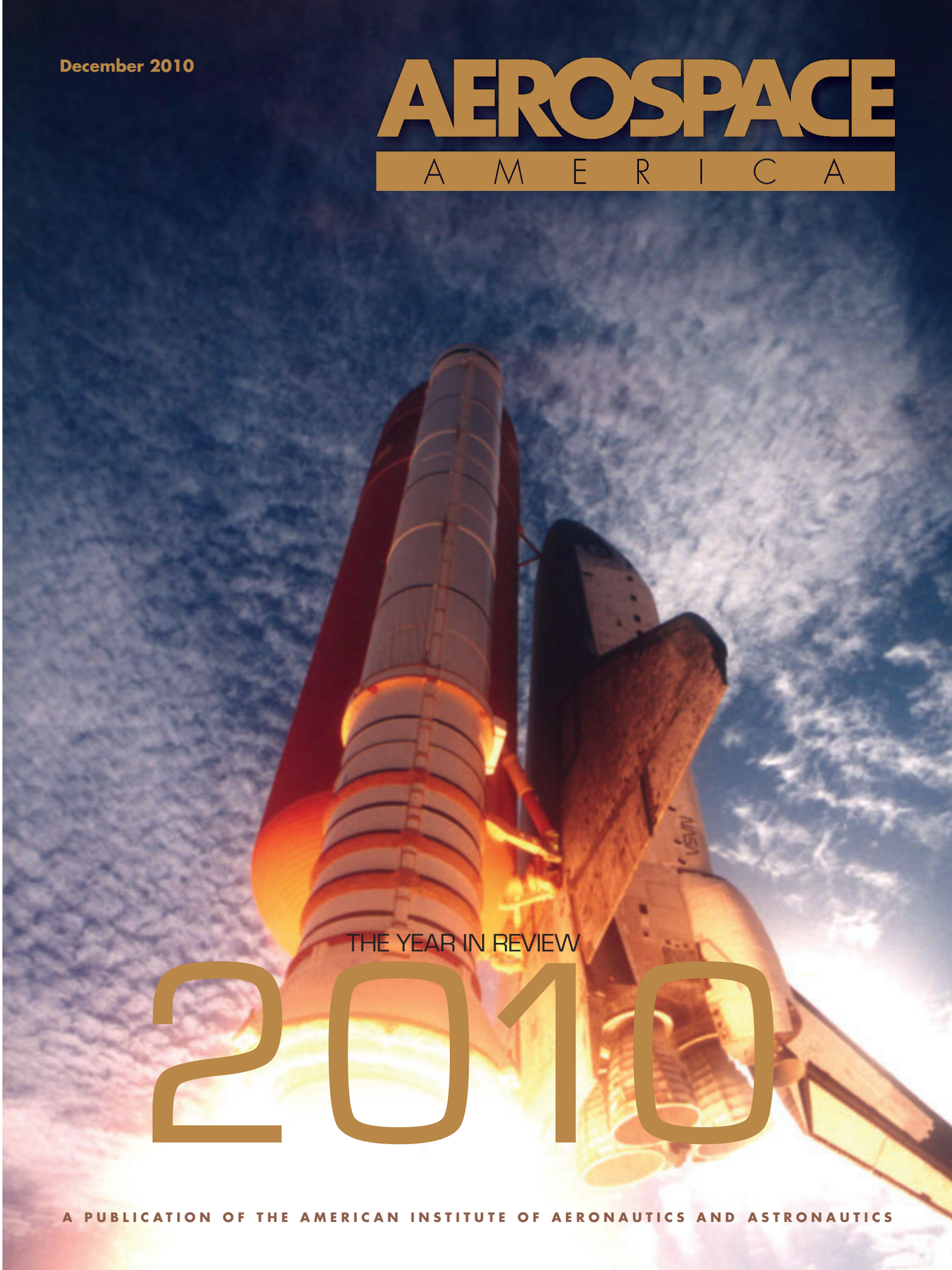
AEROSPACE AMERICA



THE YEAR IN REVIEW

2010

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Space operations and support

This year has been marked by a number of significant scientific advances in the field of spacecraft operations, including a number of asteroid mission successes. Deep Impact's flyby of Earth in June as part of its extended investigation activity en route to comet Hartley-2 was followed closely by Rosetta's flyby of asteroid Lutetia in July.

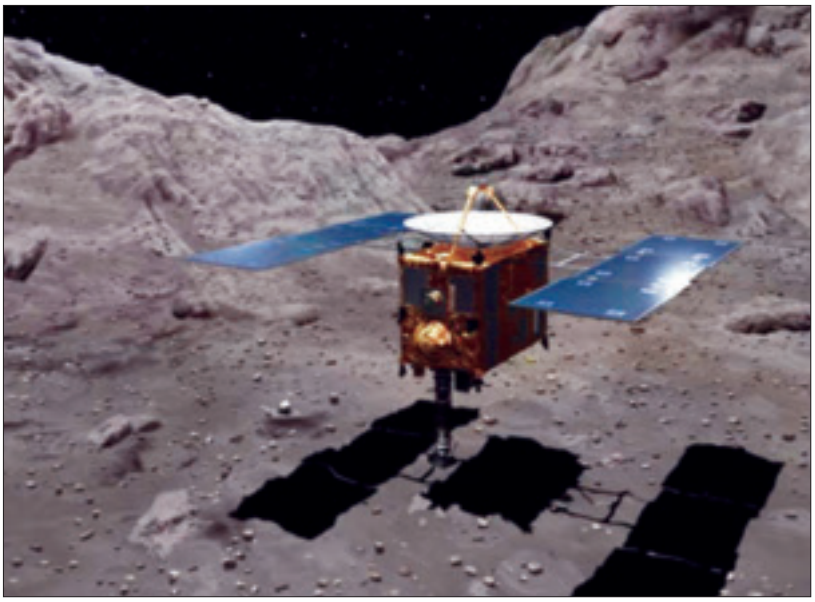
The most remarkable of the asteroid missions was undoubtedly the Japanese Hayabusa mission. Japan had already enjoyed a significant scientific operations success in May with the launch of its Akatsuki satellite to Venus. But Hayabusa became the first mission to take a sample from the surface of an asteroid (Itokawa) and return it to Earth.

The mission's success was all the more remarkable considering the issues the operations team had to overcome. The spacecraft's rover, Minerva, could not be dispatched and Hayabusa itself, which was not intended to land on the asteroid, landed for 30 minutes. The particle collection mechanism failed, but asteroid dust was collected as a result of the landing. A failure in one of the engines resulted in a loss of communications with the spacecraft for seven weeks, and JAXA needed a further 16 months to regain control. Finally the craft had to use ion thrusters to return to Earth after the chemical thruster failure.

Space debris and situational awareness remained very active topics. The widely publicized control communications failure of the Galaxy 15 satellite while maintaining transponder broadcasting in April, resulted in significant interference to neighboring spacecraft as it drifted uncontrolled in front of active geostationary orbital slots over the subsequent months. This not only caused significant disruption to the geostationary communications sector, but highlighted a less cited but equally important domain of spacecraft control failure mitigation and end-of-life strategies, compared to past years' dramatic debris events.

End-of-life passivation guidelines highlight the need for disabling intentional transmitters, and although Galaxy 15 was not being placed into an end-of-life configuration, it demonstrated very clearly the need for such guidelines during both these and mission contingency activities.

Progress in space situational awareness included the first operations of the Space Data Center, set up in 2009 as a nonprofit organization looking at conjunctions of satellites owned by its participating operators, and the expected first launch of the USAF's space surveillance satellite.



JAXA's Hayabusa overcame a series of problems before successfully returning its probe to Earth.

Commercial spaceflight has made steady progress this year, most notably by SpaceX with the successful maiden flight of its Falcon 9 heavy-lift rocket on June 4 from Launch Complex 40 at Cape Canaveral. The company achieved another major milestone on August 12 with a successful drop test of its Dragon capsule about 9 mi. off the coast of Morro Bay in California. The test validated its parachute deployment system. And though the initial flights will descend for a touchdown on the water, their goal is a land recovery. The combined Falcon 9 and Dragon were designed not only to replace the space shuttle as a cargo carrier but also to transport crew to low Earth orbit. The latter is the so-called "D" option of the Commercial Orbital Transportation Services contract, which NASA has not yet exercised.

The Dragon drop test validated the parachute deployment system.

Elsewhere in private spaceflight, Virgin Galactic's VSS Enterprise made its inaugural manned flight on March 22 in a "captive carry" flight test in which the vehicle stayed attached to the VMS Eve mothership. The flight lasted 2 hr 54 min and achieved a peak altitude of 45,000 ft.

by **Franz Newland** and **J. Paul Douglas**