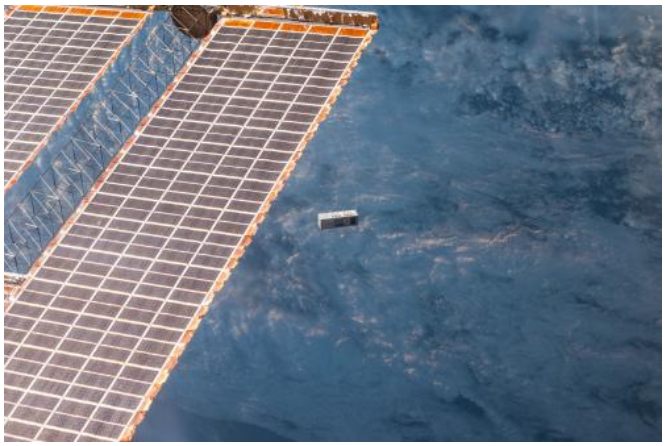
# NASA launches exo-brake parachute from ISS

27 November 2013



Credit: NASA

Mission controllers have confirmed that a small satellite launched from the International Space Station last week has successfully entered its orbit. Soon it will demonstrate two new technologies including an "exo-brake" device to demonstrate a new de-orbit technique as well as a communications system to provide precise information about the spacecraft's position.

The satellite, dubbed "TechEdSat-3p," arrived at the station aboard a Japanese H-II Transfer Vehicle Aug. 3. It was released at 2:58 a.m. EST Nov. 20, from the same Japanese Small Satellite Orbital Deployer aboard the station that launched its smaller predecessor - TechEdSat - in 2012.

"TechEdSat-3p will be the first nanosatellite of its size - a three unit cubesat - deployed from the International Space Station," said Marcus Murbach, the TechEdSat-3p principal investigator at NASA's Ames Research Center at Moffett Field, Calif.

The International Space Station is converging science, technology and human innovation to demonstrate new technologies and make research breakthroughs not possible on Earth. Launching nanosatellites to test technologies necessary for deep space exploration is just one example of how the space station is being used to as a springboard to NASA's next great leap in exploration, including future missions to an asteroid and Mars.

The primary experiment onboard TechEdSat-3p is called the "exo-brake" and is a specially-designed braking device that operates at extremely low pressures and operates similar to a parachute. The exo-brake on TechEdSat-3p will be the first to perform a rapid de-orbit and re-entry from Earth's outer atmosphere. Engineers believe exo-brakes eventually will enable small samples to be returned from the station or other orbital platforms.

TechEdSat-3p also is equipped with a short-burst data modem provided by Iridium Communications Inc. of McLean, Va. The modem will be combined with a GPS receiver to perform communications functions including providing data about the spacecraft's health and the space environment.

"TechEdSat-3p uses a completely new nanosatellite communication paradigm in that the Iridium and GPS orbiting spacecraft replace ground stations for tracking, rapid data retrieval and uplink capability," said Murbach. "Eventually, these technologies could be combined to provide another way to return cargo from the space station or other orbiting platforms."

TechEdSat-3p is the second satellite in the TechEdSat series to successfully achieve orbit. The TechEdSat series uses the cubesat standards established by the California Polytechnic State University in San Luis Obispo, that specifies nanosatellites in one unit (1U) increments of 10 cubic centimeters (approximately four cubic inches). TechEdSat-3p is a 3U satellite and weighs approximately five pounds.

Previously, the TechEdSat-1 - a 1U cubesat - successfully demonstrated the use of basic communications subsystem and a radiation-tolerant controller. It functioned in orbit for seven months until it re-entered Earth's atmosphere. This mission was followed by a successful Iridium system flight test in April during the maiden flight of Orbital Sciences' Antares-1 rocket.

"The satellite's structure, avionics and payload were custom-designed by the team to utilize the 3U volume most efficiently and provide ample space for the exo-brake deorbiter," said Murbach. "The hardware was mostly off-the-shelf components available to anyone - this makes it easier to reproduce and make adjustments for future flights."

For example, the TechEdSat-4 satellite, proposed for launch in 2014, will be very similar to the TechEdSat-3p design. It will develop further the exo-brake passive deorbiting system by adding drag-modulation for accurate de-orbit and eventual re-entry control. Future TechEdSats also will validate hardware for possible nanosatellite missions to the surface of Mars.

"This project uniquely pairs advanced university students with NASA researchers in a rapid design-to-flight experience," said Periklis Papadopoulos, TechEdSat co-investigator at San Jose State University in California. "It also provides a platform to test technologies for future NASA Earth and planetary missions, as well as providing students with an early exposure to flight hardware development and management."

TechEdSat-3p was developed, integrated and tested at Ames by student interns from San Jose State University and the University of Idaho. TechEdSat-3p is funded by Ames. The total cost in parts was less than $50,000 because the team primarily used only commercial off-the-shelf hardware and simplified the design and mission objectives.

Provided by NASA