NASAfacts

ELaNa XVIII CubeSat Launch on ICESat-2 Mission
September 2018

OVERVIEW
NASA enabled the launch of three small research satellites, or CubeSats, developed by three universities. These CubeSat missions were selected through the CubeSat Launch Initiative (CSLI). The Educational Launch of Nanosatellite (ELaNa) XVIII mission embarked as auxiliary payloads on the Ice, Cloud and Land Elevation Satellite (ICESat-2) mission on a Delta II rocket that launched Sept. 15, from Vandenberg Air Force Base in California at 11:02 a.m. ET. ICESat-2 will help scientists investigate why, and how much, our cryosphere is changing in a warming climate. The satellite will also measure heights across Earth's temperate and tropical regions, and take stock of the vegetation in forests worldwide. More than 375 students have been involved in the design, development and construction of the CubeSats.

CubeSats are playing an increasingly larger role in exploration, technology demonstrations, scientific research and educational investigations at NASA. These miniature satellites provide a low-cost platform for NASA missions, including planetary space exploration; Earth observation; fundamental Earth and space science; and technology demonstrations such as cutting-edge laser communications, energy storage, in-space propulsion and autonomous movement capabilities. They also provide educators an inexpensive means to engage students in all phases of satellite development, operation and exploitation through real-world, hands-on research and development experience on NASA-funded ride-share launch opportunities.

CSLI enables the launch of CubeSat projects designed, built and operated by students, teachers and faculty, as well as NASA Centers and nonprofit organizations. Managed by the Launch Services Program at NASA's Kennedy Space Center in Florida, ELaNa missions provide a deployment opportunity or ride-share launch to space for CubeSats selected through CSLI. ELaNa mission managers and their teams reach students at schools and colleges across the United States, providing spaceflight education through the preparation of payloads – licensing, integration and testing – that are flown in space. Since its inception in 2010, the initiative has selected more than 160 CubeSats and launched 66 CubeSat missions from primarily educational and government institutions around the United States. These miniature satellites were prioritized and selected through a formal NASA review of proposals submitted in response to CSLI announcements. NASA will announce another call for proposals in early August 2018.

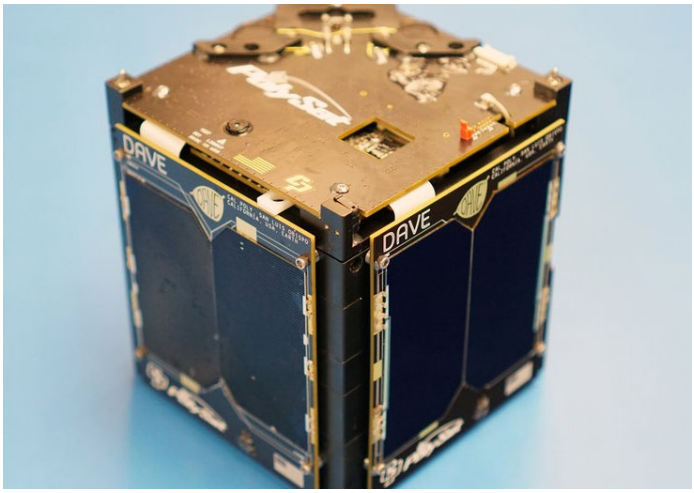
Basic CubeSat Facts:

- CubeSats are small research spacecraft called nanosatellites
- Built to standard dimensions of 1 unit (1U), which is equal to 10x10x10 cm
- Can be 1U, 2U, 3U or 6U in size
- Typically, weighs less than 3 lbs (1.33 kg) per U – 6U may be up to 6.3 lbs (14 kg)
- Deployed from standard dispensers

CUBESAT DEPLOYMENT
Three CubeSat projects were selected for the ELaNa XVIII mission. There will be three P-PODs aboard the Delta II rocket that will ferry them to space. The P-POD was designed and manufactured by the California Polytechnic State University of San Luis Obispo, California, to integrate CubeSats onto launch vehicles. After the main payload deploys, the CubeSats will separate from their P-PODs. After 45 minutes in orbit, the CubeSat transmitters will turn on and university ground stations will listen for their beacons, determine their small satellites' functionality and announce operational status. CubeSat mission durations and orbital life vary, but are anticipated to last at least a year. Upon mission completion, the CubeSats begin the CubeSats fall to Earth, burning up in the atmosphere.

SAFETY AND MISSION ASSURANCE

Each CubeSat developer verified that its satellite complied with the P-POD and NASA requirements. Each ELaNa CubeSat complies with U.S. and NASA orbital debris mitigation standard practices.



DAVE CubeSat. Credit: Cal Poly

DAVE

Damping **a**nd **V**ibration **E**xperiment

California Polytechnic State University – San Luis Obispo, California

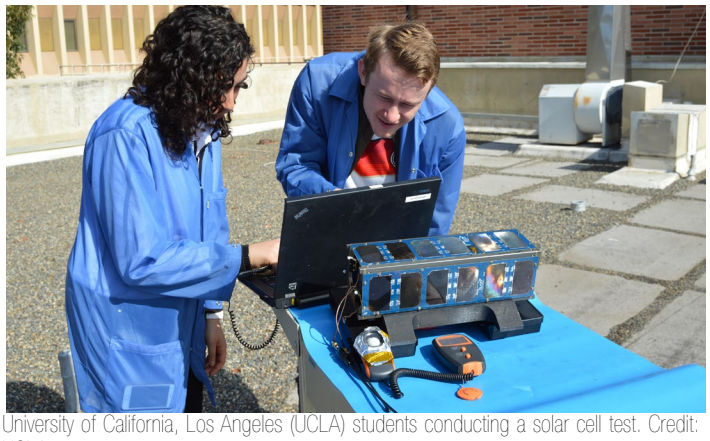
Dave is a technology demonstration mission to evaluate a mechanical damping technology in microgravity. This technology, called particle damping, exploits the dynamics of multiple constrained particles to dissipate vibration energy. Terrestrial applications demonstrate particle damping performance to be largely unaffected by extreme environments yet simple and cheap to implement. This feature set makes particle damping an attractive technology for applications in spacecraft, where dampers are needed to steady sensitive instrumentation and inhibit destructive structural resonant modes.

ELFIN A/B

Electron **L**oss and **F**ields **I**nvestigation

University of California, Los Angeles

ELFIN is a space weather CubeSat that will investigate the loss of relativistic particles from the Van Allen radiation belts radiation belts into the Earth's atmosphere. It will determine the precipitation rates and pitch-angle scattering properties of the equatorial wave-particle interactions, a fundamental plasma-physics question related to radiation belt dynamics. ELFIN uses two identical 3U CubeSats to measure how the precipitated electrons vary across space and time.

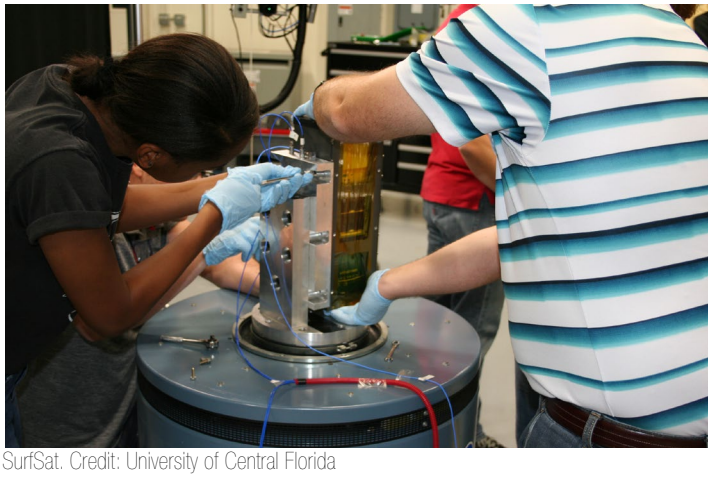


University of California, Los Angeles (UCLA) students conducting a solar cell test. Credit: UCLA

SurfSat

University of Central Florida – Orlando, Florida

SurfSat is a science investigation that will measure plasma induced surface charging and electrostatic discharge (ESD) measurements. The space radiation environment in Earth's atmosphere is filled with hot and low-density plasmas that can cause charge to build up on spacecraft surfaces, resulting in high differential voltages and subsequent electrostatic discharges. If the exposed spacecraft materials are not properly bonded, differential charging can occur which can result in unwanted and damaging electrostatic discharge events. By measuring charging and ESD events on spacecraft surfaces, SurfSat will aid in better understanding these events and can be used to provide guidance to future spacecraft development.



SurfSat. Credit: University of Central Florida

To contact the ELaNa 18 Launch Public Affairs Office, call 202-358-1100

For more information about NASA's CubeSat Launch Initiative, visit: http://go.nasa.gov/CubeSat_initiative

For more information about the ELaNa 18 CubeSats, visit:

DAVE: http://www.polysat.org
ELFIN A/B: https://elfin.igpp.ucla.edu/

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