

## ELaNa X CubeSat Launch on SMAP Mission

January 2015

### OVERVIEW

NASA will launch four small research satellites, or CubeSats, for two universities and the agency's Jet Propulsion Laboratory (JPL) in California, as part of the tenth installment of the Educational Launch of Nanosatellite (ELaNa) mission. Over 100 university students have been involved in the design, development and construction of the CubeSats that will fly as auxiliary payloads on the Soil Moisture Active Passive (SMAP) mission. Launch is planned for Jan. 29, 2015.

The CubeSat Launch Initiative (CSLI) enables the launch of CubeSat projects designed, built and operated by students, teachers and faculty to obtain hands-on flight hardware development experience. CSLI also provides access to space for CubeSats developed by the U.S. government and non-profit organizations giving all these CubeSat developers access to a low-cost pathway to conduct research in the areas of science, exploration, technology development, education or operations. Since its inception in 2010, the initiative has selected more than 100 CubeSats from primarily educational and government institutions around the U.S. These miniature satellites were chosen from a prioritized queue established through a shortlisting process from proposers that responded to public announcements on NASA's CubeSat Launch Initiative. NASA will announce another call for proposals in early- to mid-August 2015.



The ELaNa X CubeSats will launch aboard a Delta II rocket as auxiliary payloads on the Soil Moisture Active Passive (SMAP) mission.

#### Basic CubeSat Facts:

- Built to standard dimensions of 1 unit (1U) which is equal to 10x10x10 cm
- Can be 1U, 2U, 3U or 6U in size
- Weigh less than 1<sup>1/3</sup> kg (3 lbs) per U – 6U may be up to 12-14 kg
- Deployed from standardized dispensers



### CUBESAT DEPLOYMENT

Three CubeSat projects were selected for the ELaNa X mission. There will be three Poly-Picosatellite Orbital Deployers (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 90 days. Upon mission completion, 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 requirements. NASA jointly conducted a mission readiness review with each CubeSat developer.

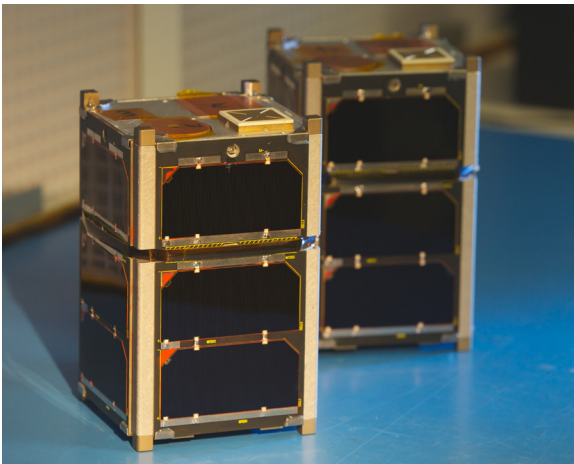
# NASAfacts



The Geostationary Coastal and Air Pollution Events (GEO-CAPE) Read-Out Integrated Circuit (ROIC) In-Flight Performance Experiment (GRIFEX) is a 3U CubeSat mission that will perform engineering assessment of a JPL-developed, all digital, in-pixel high frame rate ROIC. Its high throughput capacity will enable the proposed GEO-CAPE mission concept to make hourly high spatial and spectral resolution measurements of rapidly changing atmospheric chemistry and pollution transport with the Panchromatic Fourier Transform Spectrometer instrument in development. This technology validation mission, sponsored by NASA's Earth Science Technology Office, will advance the technology required for future spaceborne measurements of atmospheric composition from GEO relevant to climate change, as well as future missions that require advanced detectors in support of the Earth Science Decadal Survey.



The EXOCUBE mission will measure in-situ densities of various ions and neutrals in the upper ionosphere and lower exosphere. It will provide the first in-situ global neutral density data since 1983. These measurements will be used to characterize the climatology of the upper ionospheric and lower exospheric composition and help to validate current empirical and climatological atmospheric models. The densities are measured using a gated time-of-flight mass spectrometer designed and built by NASA's Goddard Space Flight Center in Greenbelt, Maryland.



**FIREBIRD-II**  
Montana State University – Bozeman  
University of New Hampshire – Durham

The Focused Investigations of Relativistic Electron Burst, Intensity, Range, and Dynamics (FIREBIRD) II mission is a space weather CubeSat mission to resolve the spatial scale size and energy dependence of electron microbursts in the Van Allen radiation belts. Relativistic electron microbursts appear as short durations of intense electron precipitation measured by particle detectors on low altitude spacecraft, seen when their orbits cross magnetic field lines which thread the outer radiation belt. FIREBIRD II will deploy as two separate 1<sup>1/2</sup> U spacecraft and provide dual point (and if operating simultaneously with FIREBIRD-I; four-point) radiation belt measurements as well as additional student hands-on training.

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To contact the ELaNa X Launch Public Affairs Office, call 202.358.1100.  
For additional information about the NASA's CubeSat Launch Initiative, visit: [http://go.nasa.gov/CubeSat\\_initiative](http://go.nasa.gov/CubeSat_initiative)

For additional information about the ELaNa X CubeSats, visit:  
GRIFEX: [www.jpl.nasa.gov/cubesat/grifex.php](http://www.jpl.nasa.gov/cubesat/grifex.php)  
EXOCUBE: [polysat.calpoly.edu/](http://polysat.calpoly.edu/)  
FIREBIRD-II: [europa.ssel.montana.edu/firebird2.html](http://europa.ssel.montana.edu/firebird2.html)

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