



## ELaNa 27 International Space Station CubeSat Deployment

Launch July 2019 – Deployment August 2019

### OVERVIEW

NASA enabled the deployment of a small research satellite, or CubeSat, developed by Northwest Nazarene University, Nampa, Idaho. This CubeSat mission was selected through the CubeSat Launch Initiative (CSLI). The Educational Launch of Nanosatellites (ELaNa) 27 mission embarked on SpaceX's 18th Commercial Resupply Services mission to the International Space Station contracted by NASA, guided to space on a Falcon 9 rocket on July 25 at 6:01 p.m. EDT from Cape Canaveral Air Force Station in Florida. Over the past three years, students have been involved in the design, development and construction of this CubeSat that was deployed from the Cygnus spacecraft via the commercially-developed SEOPS LLC SlingShot dispenser.

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 affordable means to engage students in all phases of satellite development, operation and exploitation through real-world, hands-on research and develop 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 engage schools and colleges across the United States, providing spaceflight education through the preparation (licensing, integration and testing) of payloads flown in space.

### 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
- Typically weighs less than 3 lbs. (1.33 kg) per U – 6U may be up to 6.3 lbs (14 kg)



SEOPS, LLC SlingShot Dispenser mounted on the Cygnus Spacecraft. Credit: NASA/Northwest Nazarene University

Since its inception in 2010, the initiative has selected more than 175 CubeSats and launched 89 CubeSat missions primarily developed by 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 announced another call for 2020 proposals on August 5, 2019.

# NASAfacts

## CUBESAT DEPLOYMENT

In preparation for deployment, the CubeSat is placed inside the SlingShot dispenser, a ground-loaded deployment system. Built by SEOPS, LLC, each deployer accommodates up to 6U of CubeSat volume. On orbit, just prior to the Cygnus undocking, astronauts aboard the space station will mount the SlingShot dispenser containing the CubeSat onto the hatch of the Cygnus cargo delivery vehicle. After undocking, the Cygnus will fly up to 500 km above Earth where it will deploy the CubeSat. After 30 minutes in orbit, the internal timer on the CubeSat will allow its onboard computers to activate and begin transmitting. The CubeSat team utilizes ground stations to listen for a beacon to determine their small satellite's functionality and operational status. The CubeSat mission is anticipated to last at least three years, although durations sometimes vary. Upon mission completion, the CubeSat begins a final fall through Earth's atmosphere, where tremendous heat generated by friction causes it to disintegrate.

## SAFETY AND MISSION ASSURANCE

Each CubeSat developer has verified that their satellite is compliant with the ISS and SlingShot ICD requirements. Each ELaN CubeSat complies with U.S. and NASA orbital debris mitigation standard practices.

## RFTSat

Radio Frequency Tag Satellite

NASA Wallops Flight Facility–Wallops Island, Virginia

Northwest Nazarene University – Nampa, Idaho

RFTSat is a technology demonstration mission to show the application of radio frequency (RF) energy harvesting and backscatter communication to the problem of distributed sensing in space. The 3U satellite will contain an RF tag reader and a passive RF tag equipped with a temperature sensor. The tag will harvest energy from the signal transmitted by the reader and communicate data to the reader by scattering a portion of the reader's transmitted signal. The sensor data will be downlinked using a Globalstar radio. RF tags equipped with sensors could be used to monitor structural integrity or space weather in future missions. RFTSat is funded by NASA's Undergraduate Student Instrument Project.



Students working on the development of RFTSat Credit: NASA/Northwest Nazarene University

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To contact the ELaN 27 Launch Public Affairs Office, call 202-358-1100.

For more information about NASA's CubeSat Launch Initiative, visit: [http://go.nasa.gov/CubeSat\\_initiative](http://go.nasa.gov/CubeSat_initiative)

For more information about the RFTSat, visit: <https://engineering.nnu.edu/research/rftsat>

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