NRO Mission

The National Reconnaissance Office (NRO), a joint Intelligence Community and Department of Defense organization, is responsible for developing, acquiring, launching, and operating America's reconnaissance satellites, as well as operating their related data processing facilities, that collect intelligence information in support of national security.

CubeSat Overview

The NRO is committed to innovative, mission-driven space acquisitions that ensure our systems – from large to small – continue delivering invaluable intelligence for the nation. CubeSats are uniquely qualified to support this goal by providing more frequent on-orbit opportunities to demonstrate, apply, and mature technologies that help our nation's leaders and policymakers stay ahead of emerging threats to the national security mission.

Researchers work on the USS Langley, a U.S. Naval CubeSat that was launched aboard the U.S. Air Force AFSPC-5 mission in May 2015, from Cape Canaveral Air Force Station. (U.S. Navy photo)

Historical Facts

The CubeSat concept was designed and developed by California Polytechnic State University and Stanford University in 1999. Since then, more than 70 U.S. companies, 50 U.S. universities, and 41 foreign universities have engaged in CubeSat research and project maturation.

In early 2007, the NRO and other U.S. government partners recognized the utility of CubeSats and actively engaged universities, service academies, laboratories, and industry to advance the state of practice.

Efficiencies & Benefits

- Risk reduction: For the NRO, CubeSats offer an effective technology risk reduction pathway for developing innovative new capabilities for the nation's overhead architecture. CubeSats' lower costs allow the NRO to take a reduced-risk approach to prove new technologies before transitioning them to major systems.
- Rapid development: CubeSats can have a short development life cycle. This rapid development cycle can present an innovative way for the NRO to quickly introduce and mature technology to provide a wide range of customers with timely and relevant overhead intelligence data.
- Enhancing capabilities: CubeSats can sometimes be used in conjunction with the NRO's traditional large satellite systems to put innovative capabilities on orbit quickly.
- Decrease costs: CubeSats can be developed, launched, and controlled at a fraction of the cost of a typical satellite system due to a variety of factors, including:
    - Standardized interfaces between the payload, the launch mechanism and a small, standardized cube-shaped bus that can be easily deployed.
    - Opportunities for CubeSat rideshare launches aboard NRO, NASA and Air Force launches on a variety of vehicles (e.g., Antares, Minotaur I/V, Falcon 9, Delta II, Taurus XL, Atlas V) achieve cost savings and accelerate the delivery of on-orbit capabilities.

NRO's Multi-Mission Manifest

In the past, the term Rideshare has often been used to describe NRO's small satellite launch solutions. However, because the NRO provides innovative launch solutions with multi-mission partnerships, the agency has adopted multi-mission manifest as the new nomenclature for these unique launch acquisitions. This has resulted in increased launch opportunities for CubeSats and small satellites. The potential capabilities and technologies associated with small satellite research continue to be a focus for government, academia, and industry. This research environment and the streamlined path to launch are two reasons why NRO continues to support this growing mission area.

NRO's CubeSats

Orbital ATK-8 (OA-8) successfully launched a multi-mission manifest of 14 smallsats including NRO CubeSats on November 12, 2017.

- OA-8's primary mission was International Space Station (ISS) resupply;
- Fastest transit time to the ISS
- Most CubeSat payloads on a launch to the ISS;
- First NRO payloads launched from Wallops Island, Virginia;
- First NRO launch on an Antares rocket;

OA-8 highlighted incredible feats of engineering, integration, launch operations, and partnerships among NRO, DoD, NASA, and industry partners.

Earlier NRO-sponsored Rideshare Missions:

- OUTSat (Operationally Unique Technology Satellite) on NROL-36, in August 2012
- GEMSat (Government Experimental Multi-Satellite) on NROL-39, in December 2013
- ULTRASat (Ultra Lightweight Technology and Research Auxiliary Satellite) on Air Force mission, AFSPC-5, in May 2015

GRACE (Government Rideshare Advanced Concepts Experiment) is the NRO auxiliary payload that carried 13 CubeSats, nine sponsored by the NRO, to space as part of NROL-55 in October 2015.

GRACE NRO-sponsored CubeSats were developed by the Aerospace Corporation (AeroCube-5c and AeroCube-7), the Army's Space and Missile Defense Center (SNaP-3), Tyvak (PropCube), and SRI International (SINOD-D).

- AeroCube-5c and AeroCube-7 - technology pathfinders that weigh 1.5 kilograms each and demonstrated tracking technologies, optical communications, and laser communication.
- SNaP-3 - Three CubeSats, weighing 4.5 kilograms each, whose mission was to develop user software-defined radios to provide beyondline-of-sight communication for disadvantaged users in remote locations.
- PropCube - Two one-kilogram CubeSats performing dual frequency ionospheric calibration measurements.
- SINOD-D - Two two-kilogram CubeSats demonstrating software-defined radio communications.