CubeSat
Fact Sheet

NRO Mission

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

CubeSat Overview

The NRO is committed to innovative, mission-driven acquisitions that ensure its space systems—from large to small—continue delivering invaluable intelligence for the nation. CubeSats, a class of research spacecraft called nanosatellites, are uniquely qualified to support this goal by providing more frequent on-orbit opportunities to demonstrate, apply and mature technologies—rapidly and at relatively low cost and low risk—that help our nation's leaders stay ahead of emerging threats.

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 and 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—often launching in less than 18 months. This rapid development cycle presents an innovative way for the NRO to quickly introduce and mature technologies to provide a wide range of customers with timely and relevant overhead intelligence data.
- Enhance 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; and
    - Opportunities for CubeSat rideshares aboard NRO, NASA, and U.S. Air Force launches on a variety of vehicles, which saves cost and accelerates the delivery of on-orbit capabilities.

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NRO's Multi-Mission Manifest

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 partners, the agency has adopted multi-mission manifest as the new nomenclature for these unique launch acquisitions. This shift 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 the NRO continues to support this growing mission area.

NRO's CubeSats

The IMPACT program is a research and development effort, led by the NRO's Advanced Systems and Technology (AS&T) Directorate, that uses CubeSats to provide early evaluation of new technologies in space. This annual collaborative launch program provides a risk tolerant workspace for experimental payloads, matures multiple novel technologies per launch, and drives miniaturization—all while helping both new and seasoned commercial partners rapidly develop, mature, qualify, and transition new technologies into NRO systems.

Orbital ATK-8 (OA-8) successfully launched a multi-mission manifest of 14 smallsats, including NRO CubeSats on Nov. 12, 2017. OA-8's primary mission was an International Space Station (ISS) resupply, but served as the vehicle for the first NRO payloads launched from the NASA Wallops Space Flight Facility, Wallops Island, Va., and NRO's first launch aboard an Antares rocket. OA-8 highlighted benefits of government and commercial partnership in the research and development arena as well as in launch operations.

GRACE (Government Rideshare Advanced Concepts Experiment) was an NRO auxiliary payload of 13 CubeSats, nine sponsored by the NRO, as part of NROL-55 launched from Vandenberg Air Force Base (VAFB), Calif. in October 2015. GRACE NRO-sponsored CubeSats were developed by the Aerospace Corporation, the Army's Space and Missile Defense Command (SNaP-3), Tyvak (PropCube), and SRI International (SINOD-D).

The ULTRASat (Ultra Lightweight Technology and Research Auxiliary Satellite) program launched 10 CubeSats in May 2015 as part of the U.S. Air Force's AFSPC-5 mission from Cape Canaveral Air Force Station (CCAFS), Fla., marking the first use of the Aft Bulkhead Carrier (ABC) aboard an Air Force mission to carry the auxiliary payload. NRO sponsored nine of the CubeSats, developed by the U.S. Naval Academy, George Washington University, Cal Poly, Aerospace Corporation, and the Air Force Research Laboratory, and hosted a variety of experiments of interest to scientific and technical communities.

GEMSat (the Government Experimental Multi-Satellite) rideshare deployed 12 experimental CubeSats aboard NROL-39 from VAFB, Calif., in December 2013.

GeoLITE (Geosynchronous Lightweight Technology Experiment) was launched in May 2001 aboard a Boeing Delta-II booster from CCAFS, Florida. The CubeSat was an advanced technology demonstration satellite with a laser communications experiment and an operational UHF communications mission.