



Nanosat Missions and Plans at NASA Ames

Supporting the Goals of Science Investigations, Technology Development, and Advanced Exploration Systems



GeneSat

NASA's first fully automated, self-contained biological spaceflight experiment on a satellite of its size. Demonstrated an integrated analytical fluidics card assembly to monitor genetic changes of *E. coli* bacteria.



PreSat

Served as a risk-reduction and technology demonstration mission for PharmaSat.

NanoSail-D1

3U CubeSat to study the deployment of a solar sail in space.

PharmaSat

Grew and characterized yeast (*S. cerevisiae*), tracked metabolic activity in 48 μ wells. Demonstrated > 7 weeks biocompatibility + survival in space followed by growth.

O/OREOS

Rehydrated, grew and characterized DRIED microbes (*B. subtilis*) in 36 fluidic wells. Demonstrated satellite bus and payload instrument functionality (> 2.5 years) and simultaneous CDRH.

NanoSail-D2

3U CubeSat to study the deployment of a solar sail in space - originally built as a ground spare for NanoSail-D1. Successful sail deployment.

PhoneSat 1b

First flight of a smartphone on a suborbital balloon test.

TechEdSat

First U.S. CubeSat launched from ISS. Demonstrated Plug-Play Avionics.

PhoneSat 1& 2j

Demonstrated that COTS reaction wheels and custom torque coils can work for low-cost Attitude Determination and Control Systems, and that NASA solar arrays charge batteries.

PhoneSat 2.4

Demonstrated that low-cost COTS ADCS works in space and that an Android™ processor works as S-Band command and telemetry modem. Demonstrated Nexus S long-term radiation survivability.

PhoneSat 2.5

Demonstrate that low-cost COTS ADCS works adequately in space, verify Google's Android™ processor can support space-based communications systems, demonstrate transfer of images to groundstation.

SporeSat

Demonstrate growth of organisms in gel medium. Update of Ames NanoSat Bus: processor, memory, Class B v/v.

TechEdSat-4

Refight of TechEdSat-3p Exobrake, with initial controllability for cross-range experiment. Improvedidium modems utilization.

EDSN

Demonstrate the utility of multiple small spacecraft working together in a cooperative manner. Cross link data on orbit between the satellite swarm and acquire simultaneous multipoint science data.

NODES

Extends EDSN capabilities to include command relay and negotiated control.

NLAS

Modular platform with configurable sequencing for deploying multiple secondary nanosat. Capability to deploy (8) 3U or (4) 6U or a combination up to 24U total.

NLAS Sequencer and Dispensers

Distributes 1 signal to 8 programmable outputs with the sequences reconfigurable via a GUI. Built-in software and hardware redundancies and is internally powered. Dispensers configurable to hold up to 24U.

TechEdSat-5

Refight of TechEdSat-4 Exobrake, with initial controllability for cross-range experiment. Improvedidium modems utilization.

SLPS-4

Mission of opportunity number 4 under the HEO Space Life and Physical Science Program. Science payload to be completed in FY15.

SporeSat 2

Demonstrate growth of organisms in gel medium. Update of Ames NanoSat Bus: processor, memory, Class B v/v.

EcAMSat

First 6U space biology mission and first 6U NLAS dispenser use. Demonstrate *E. coli* orbital resistance changes due to radiation and gravity. High power NanoSat Bus.

PhotoSyn

Proposal of a nanosat to demonstrate photosynthetic efficiency in zero-g and with variable radiation doses. For deployment on a future EM-X mission in cis-lunar space.

Propulsion Pathfinder #1

Fight test CubeSat propulsion system #1 in a relevant space environment. Characterize the system's performance and demonstrate the capability to perform orbital maneuvers.

BioSentinel

Demonstrate use of simple organisms as "biosentinel". Autonomous Interplanetary spacecraft deployed via EM-1 mission in cis-lunar space.

Propulsion Pathfinder #2

Fight test CubeSat propulsion system #2 in a relevant space environment. Characterize the system's performance and demonstrate the capability to perform orbital maneuvers.

Propulsion Pathfinder #3

Fight test CubeSat propulsion system #3 in a relevant space environment. Characterize the system's performance and demonstrate the capability to perform orbital maneuvers.

SPHERES

Consists of 3 free flying satellites on board the ISS that test a diverse range of hardware and software

NASA Ames

- Achieves world-class Science with its Nanosat Missions
- Leads the development and flight of NASA Nanosat Systems
- Partners with Academia, Industry, and other Government Agencies including International Space Agencies on Nanosats

■ = Launched
■ = In development
 = Future mission in formulation

