



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.



PharmaSat

Grew and characterized yeast (*S. cerevisiae*); tracked metabolic activity in 48 μ wells. Demonstrated > 7 weeks biocompatibility - survival in stasis 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 C&DH.



PhoneSat 1b

First flight of a smartphone on a suborbital balloon test.



TechEdSat

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



PhoneSat 1 & 2 β

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



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 transmit of images to groundstation.



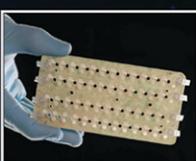
TechEdSat-4

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



EcAMSat

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



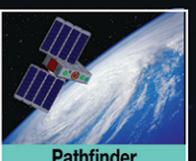
PowerCell

The PowerCell payload will investigate the performance of microbial mini-ecologies containing both photosynthetic microbes and consumer organisms. PowerCell is a payload on the DLR Eu:CROPIS CompactSat.



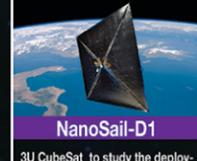
BioSentinel

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



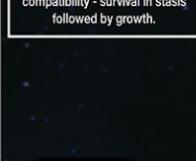
Pathfinder Technology Demonstrator

Demonstrate and characterize novel small satellite technologies in low earth orbit.



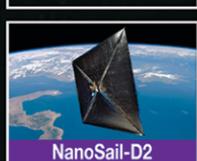
NanoSail-D1

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



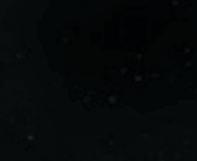
NanoSail-D2

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



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.



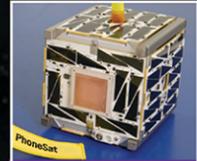
PhoneSat 2.4

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.



SporeSat

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



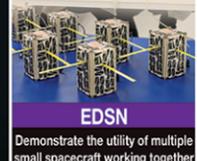
EDSN

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.



TechEdSat-5

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



NLAS

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



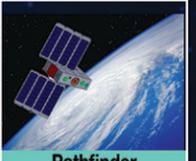
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SPHERES

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



NLAS Sequencer and Dispensers

Distributes 1 signal to 9 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.



ASTROBEE

Free-flying robot inside the Space Station for mobile sensing and 0g robotics tests. Launch NET Fall 2017.

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

