



Space Technology Mission Directorate Science Mission Directorate

Small Spacecraft Systems Virtual Institute (S³VI)

Bruce Yost
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Cubesat Developer's Workshop



- Advance clear communications, coordination, and consistent guidance regarding small spacecraft activities across NASA
 - Enhance internal integration
 - Act as single point of contact for information dissemination
 - Serve as repository for streamlined development approaches and processes
- Provide US smallsat research community with access to mission enabling information
 - Within NASA
 - Other government agencies (OGAs)
 - Academia
 - Industry

S3VI is a NASA-wide Institution



S3VI Strategy



- Collect useful set of tools, information, and knowledge and distribute to the smallsat community
- Communicate to industry and academia NASA's needs and goals for smallsats
- Create focused working groups, as required, to address critical issues facing the smallsat community
- Identify and encourage collaborations with other government agencies with similar interests or needs

“Engage, Collaborate, Share, Launch”



Year 1 Tasks



- Develop and maintain the NASA Small Spacecraft Web Portal
- Support the NASA Small Spacecraft Community of Practice (CoP)
- Support the NASA Small Spacecraft Coordination Group (STMD/C. Baker + SMD/L. Kepko).
 - HEO coordination in process
- Maintain and update the the STMD Small Spacecraft Technology State of the Art (SoA) report
 - Linked into Web Portal

Web Portal

<https://www.nasa.gov/smallsat-institute>



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Small Spacecraft Virtual Institute

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Recent SmallSat News

[NASA Selects CubeSat, SmallSat Mission Concept Studies](#)

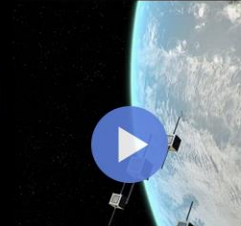
NASA has selected ten studies under the Planetary Science Deep Space SmallSat Studies (PSDS3) program, to develop mission concepts using small satellites to investigate Venus, Earth's moon, asteroids, Mars and the outer planets.

For these studies, small satellites are defined as less than 180 kilograms in mass (about 400 pounds). CubeSats are built to standard specifications of 1 unit (U), which is equal to 10x10x10 centimeters (about 4x4x4 inches). They often are launched into orbit as auxiliary payloads, significantly reducing costs.

[Archived SmallSat News](#)



Small Spacecraft State of the Art



ScienceCasts: NASA Embraces Small Satellites



Small Spacecraft Virtual Institute (About Us)

The mission of the Small Spacecraft Systems Virtual Institute (S3VI) is to advance the field of small spacecraft systems and allied sciences by promoting innovation, exploring new concepts, identifying emerging technology opportunities, and establishing effective conduits for the collaboration and the dissemination

Small Spacecraft Body of Knowledge

The S3VI, as the common portal for NASA related small spacecraft activities, will host the Small Spacecraft Body of Knowledge (SSBK) as an online resource for information such as small spacecraft working group products, lessons learned library, systems test data repository, and reliability best practices.



NASA Smallsat Opportunities

Key S3VI Web Portal Features



- Small Spacecraft Body of Knowledge (SSBoK)
 - SoA (already exists); online web access, self submittal feature
 - Lessons Learned and Best Practices dbs (to be developed/acquired)
 - Smallsat Community of Practice db
 - Other dbs (i.e., component catalogues, test libraries, etc.)
 - Small Satellite Conference – Manuscript and Presentation Archives
 - CubeSat Developers' Workshop – Manuscript and Presentation Archives
- Links to feature stories (Recent SmallSat News)
- Small spacecraft user guides, standards, and other documentation
- Capabilities database for small spacecraft, including federal and non-federal small spacecraft users, commercial products and services
- NASA small spacecraft mission and tech funding opportunities
- Launch opportunities (including CSLI, DoD*, commercial)
- Working Groups repositories, collaboration tool kits, proceedings
- Smallsat Seminar Series
- External links of interest to community, including upcoming smallsat workshops, conferences, events, etc.
- Virtual Collaboration Tools

**Some DoD launch information not for wide dissemination.*



STMD Small Spacecraft Technology State of the Art Report



The S3VI maintains the online Small Spacecraft State of the Art Report

- The online version is available: <https://sst-soa.arc.nasa.gov>
- For Feedback solicitation, individuals may submit an email to:
< arc-sst-soa@mail.nasa.gov >
- The online report is being enhanced through further expansion of collaboration with other government agencies and industry
- Partnering with AFRL for Space Parts on Orbit Now (SPOON) database
 - Annual RFI for submission of information in development
 - Vendors, research labs can self submit
 - Annual report collated and released prior to Smallsat in August, but continuously updated



Working Groups Support

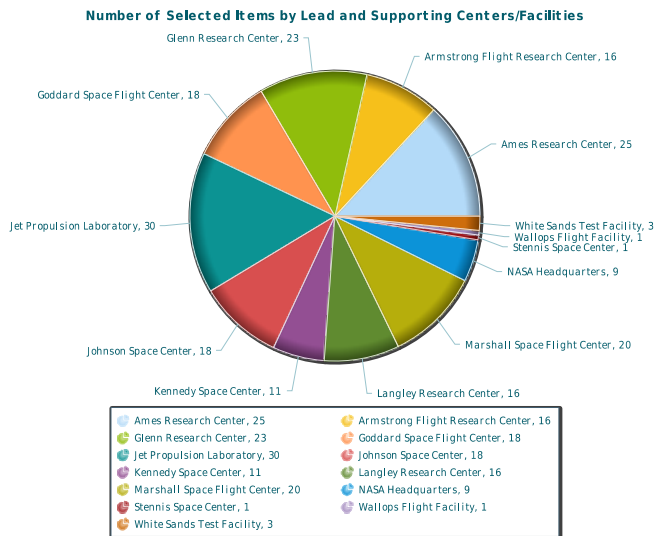


- Small Spacecraft Reliability WG (*up and running*)
 - Co-chaired by GSFC and JPL; NASA + OGAs membership
 - Create pathway for science and exploration quality smallsats
 - First open meeting with industry held March 14-15 in Pasadena
 - Reports archived on line on S3VI portal
- Smallsat Access to Space WG (*in formulation*)
 - Initial members: GSFC (lead), ARC, MSFC, KSC, and JPL
 - Support NASA-wide rideshare capabilities and policies development
- *Examples of other potential WGs (TBD start dates)*
 - *Smallsat propulsion*
 - *Deep space communications for smallsats*
 - *Smallsat power*
 - *Smallsat testing philosophy (may be part of Reliability WG?)*
 - *Frequency licensing for smallsats*
 - *Orbital debris*

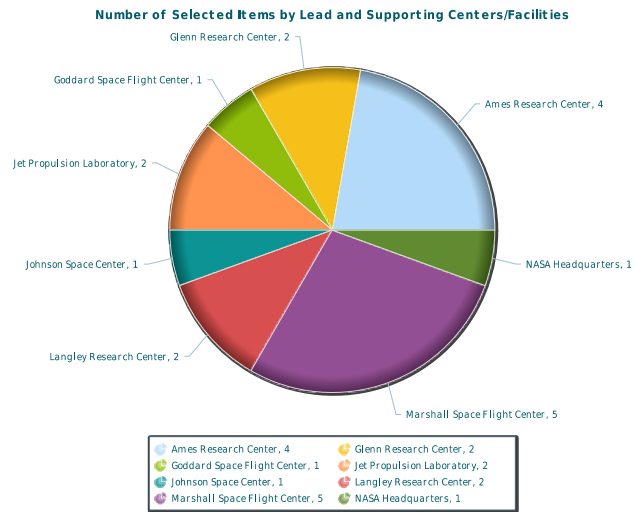
Agency Small Spacecraft / Satellite Projects – TechPort Key Word Search Results – Projects by Center



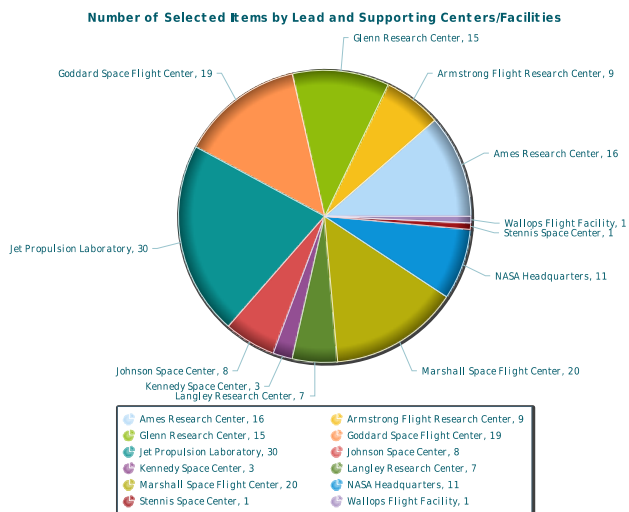
Key Word: **Small Spacecraft** Result: 146 Projects



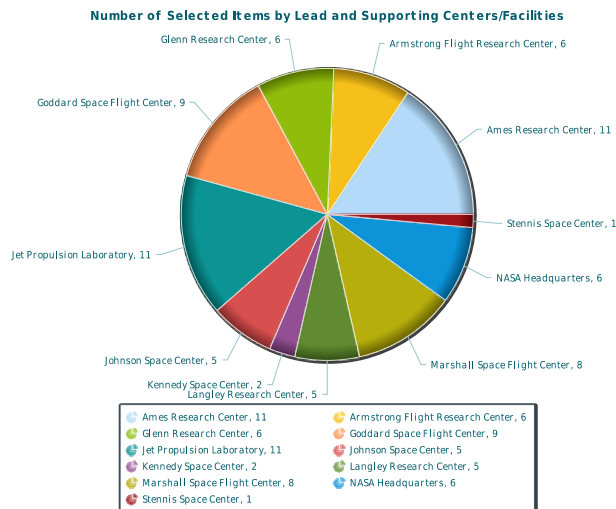
Key Word: **Nanosatellite** Result: 16 Projects



Key Word: **CubeSat** Result: 121 Projects



Key Word: **Small Satellite** Result: 60 Projects



Agency Small Spacecraft / Satellite Projects – TechPort Key Word Search Results - Summary



TechPort Key Word Search Results

REPORT: Number of Selected Items by Lead and Supporting Centers / Facilities

	KEY WORD SEARCHED				Total Projects, Programs, Elements Supported by Center
	Small Spacecraft	Small Satellite	CubeSat	Nanosatellite	
NASA Headquarters	9	6	11	1	27
Ames Research Center	25	11	16	4	56
Armstrong Research Center	16	6	9	0	31
Glenn Research Center	23	6	15	2	46
Goddard Space Flight Center	18	9	19	1	47
Jet Propulsion Laboratory	30	11	30	2	73
Johnson Space Center	18	5	8	1	32
Kennedy Space Center	11	2	3	0	16
Langley Research Center	16	5	7	2	30
Marshall Space Flight Center	20	8	20	5	53
Stennis Space Center	1	1	1	0	3
Wallops Flight Facility	1	0	1	0	2
White Sands Test Facility	3	0	0	0	3
Key Word Search Results for Total Projects, Programs, and Elements	146	60	121	16	343 / 419

Notes

- Duplication of projects listed across key word search is known.
- Multiple Centers are identified as supporting each of the projects resulting in the key word search accounting for a higher number (419) of projects listed for the Centers than accounted for in the number of projects, programs, and elements (343).