
VIRGINIA
SPACE GRANT
CONSORTIUM
Presentation to Nanosatellite Advisory Committee, Joint Commission on Technology and Science
Virginia Space Grant Consortium Overview
Mary Sandy, Director
November 18, 2014
NASA

NSGA
National Space Grant Alliance

America's Space Grant Program

52 Consortia:

Every state + D.C. and Puerto Rico

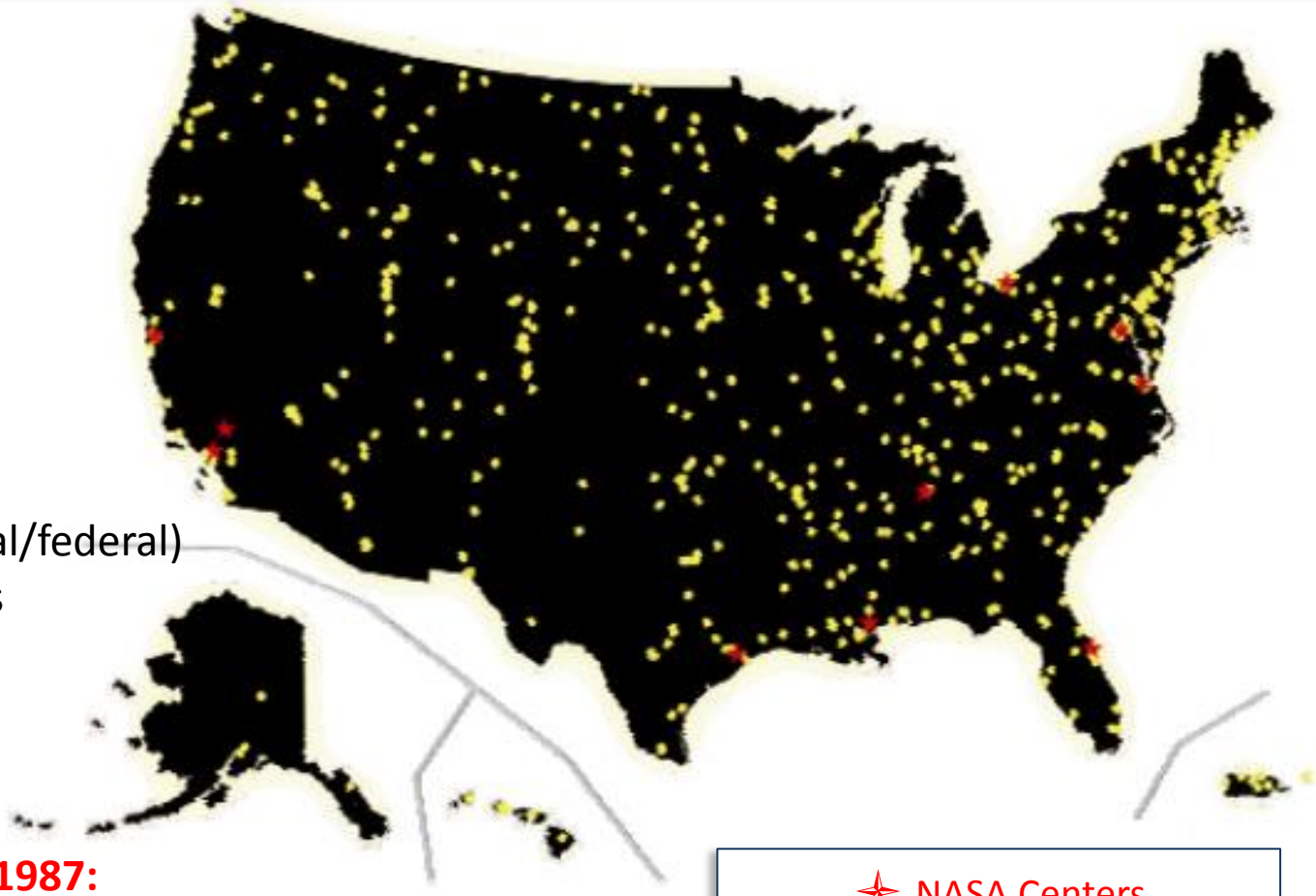
987+ Affiliates:

652 higher education
87 industry
83 governmental (state/local/federal)
76 museum/science centers
89 other local partners

Public/Private Partnerships

Established by Congress in 1987:
Public Law 100 - 147

Virginia Space Grant began in 1989



VSGC Member Institutions

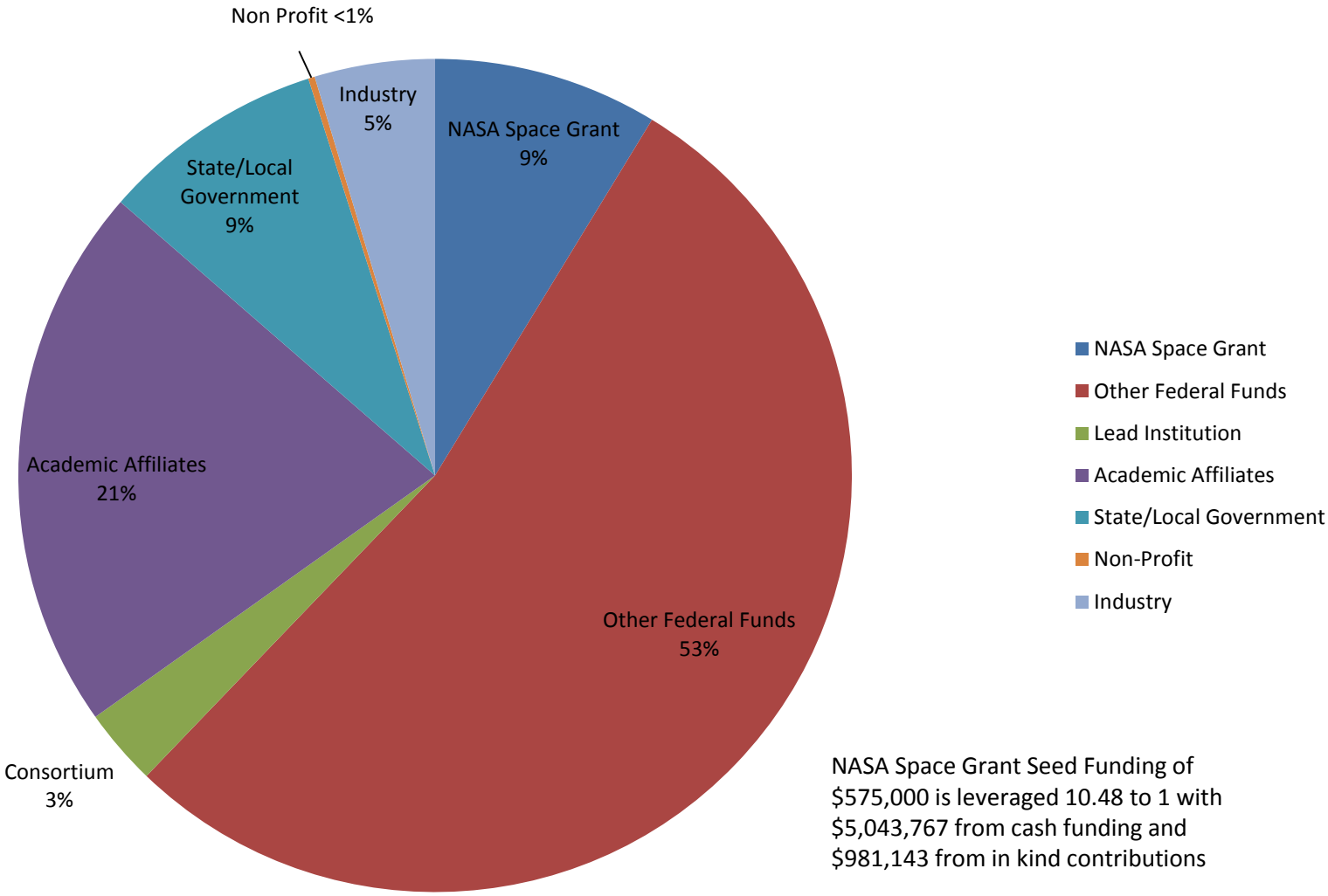
College of William and Mary
Hampton University
Old Dominion University
University of Virginia
Virginia Polytechnic Institute and State University
NASA Langley Research Center
NASA Goddard Space Flight Center's Wallops Flight Facility
State Council of Higher Education for Virginia
Virginia Community College System
Virginia Department of Education
MathScience Innovation Center
Science Museum of Virginia
Virginia Air and Space Center
Center for Innovative Technology

VSGC has worked with more than 500 program partners

Space Grant Goals

- Establish state and national networks of universities with capabilities in aerospace-related fields.
- Promote strong science, engineering, and technology education from elementary through university levels.
- Foster workforce development through building the nation's talent pool in STEM fields.
- Develop cooperative programs among universities, all levels of government, and industry.
- Build aerospace-related research infrastructure at Virginia's Space Grant Universities.
- Recruit women, underrepresented minorities, and persons with disabilities for careers in STEM.
- Encourage an interdisciplinary approach to fields relating to aerospace and aeronautics.
- Enhance public awareness of the benefits of aerospace-related research and exploration.

2013 Funding for Virginia Space Grant Consortium



NASA Space Grant Seed Funding of $575,000 is leveraged 10.48 to 1 with $5,043,767 from cash funding and $981,143 from in kind contributions

VSGC

- **VSGC top ranked program by NASA in last ranked evaluation (out of 52 programs).**
- **VSGC has received > $50 million in grants and contracts from NASA, NSF, FAA, DOD, Department of Energy, US DoED, National Academies Education, the Commonwealth of Virginia, and many other sources.**
  - **Strong NASA Ties**
  - **NASA Langley and NASA Wallops are VSGC members**
  - **Have worked with all 10 NASA Centers.**
- **VSGC Director previously served as Head of Education and Public Service for NASA Langley and as PAO for Aeronautics and Space Technology at NASA HQ. Serves on the Governor's Aerospace Advisory Council and co-facilitates Informal Working Group of Virginia Aerospace Leaders.**
- **VSGC Director has served as Chair, National Council of Space Grant Directors and Chair, Space Grant Alliance.**

VSGC Organization

Board of Directors:

Mr. John Broderick – Chair, Old Dominion University

Dr. William Harvey, Hampton University

Dr. W. Taylor Reveley, III, College of William and Mary

Dr. Teresa Sullivan, University of Virginia

Mr. Peter Blake, State Council of Higher Education for Virginia

Mr. Peter Jobse, Center for Innovative Technology

Dr. Glenn DuBois, Virginia Community College System

Dr.Timothy Sands – Virginia Tech

Advisory Council:

Representatives from each of the members.

Director and Staff (19 individuals)

ODU Research Foundation is fiscal agent.

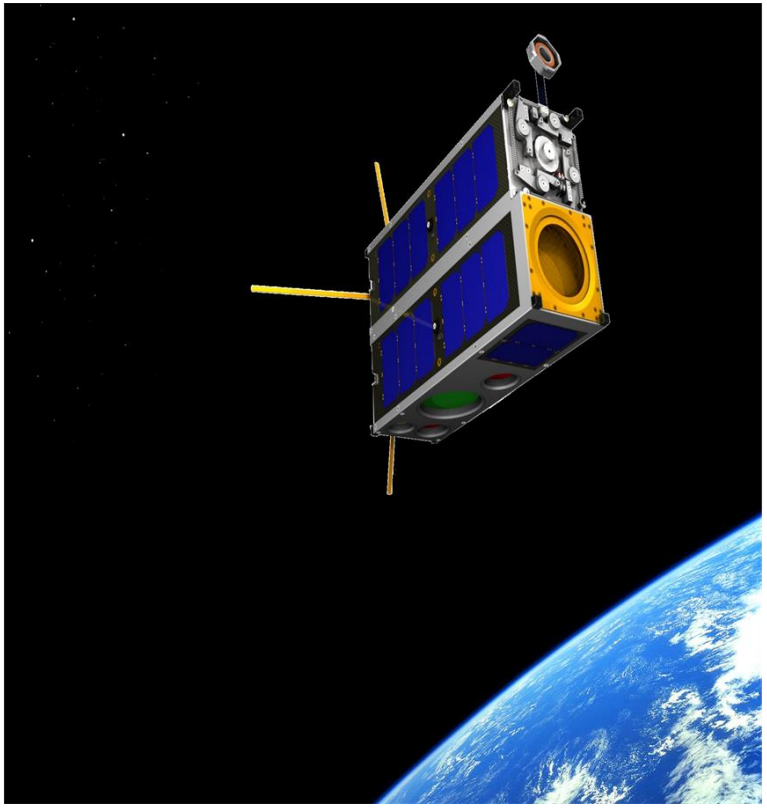
Program Areas

- **Student Research and Mission Opportunities.**
- **Building Research Capabilities/Research Partnerships.**
- **Scholarships/Fellowships/Internships.**
- **Workforce Development for the STEM Pipeline - K–Post Doc.**
- **Higher Education.**
- **Precollege – Teacher Professional Development and Student Enrichment Programs.**
- **Public Science Literacy/Informal Science Education.**

Student Flight Programs and Design Competitions

Student Flight Programs

- Cubesats
- Sounding rocket missions
- Microgravity experiments
- Space Station experiments
- Research balloon payloads
- Airborne experiments
- Design projects

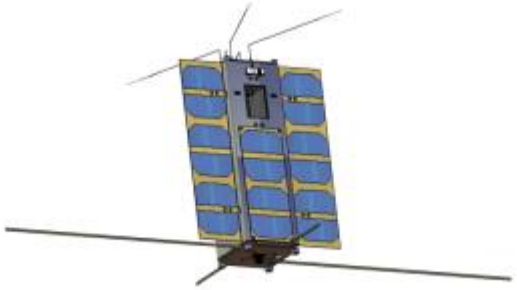


Student Flight Opportunities

- **Give students hands-on experience building payloads for space environment**
- **Conducting meaningful science and engineering**
- **Students participate in rigorous flight readiness review processes**
- **Student participation leads to internships and job opportunities at NASA and other Aerospace companies**
- **VSGC has been key to supporting these programs at Space Grant universities and community colleges and for precollege projects**

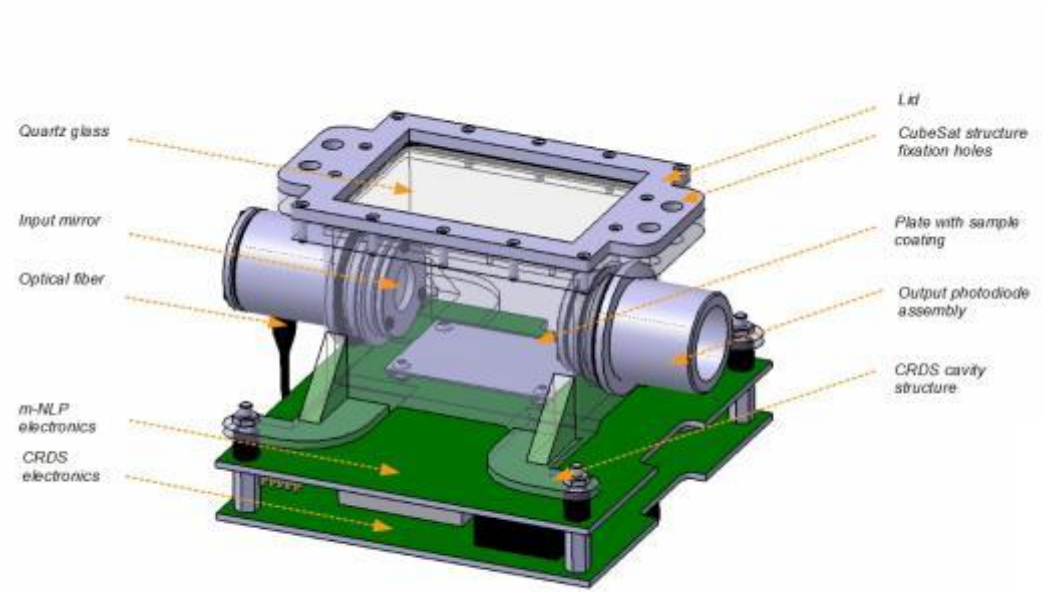
OGMS-SA Satellite Project

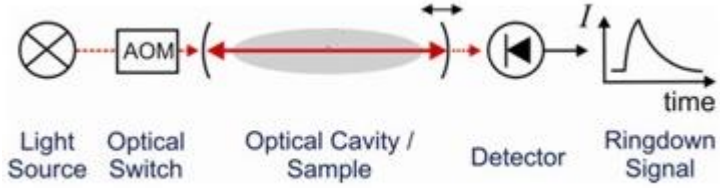
- **Small Satellite Project (3U) with the following French institutions: Université Paris-Est Créteil (UPEC); Observatoire de Paris-Meudon (OBSPM); Centre National de la Recherche Scienctifique – Institut National des Sciences de L'Univers (CRNS-INSU); Center National d' Études Spatiales (CNES), Paris.**
- **VSGC has administrative lead for US collaboration; Virginia Tech has technical lead. ODU and UVA are also participating.**
- **Cubesat is part of QB-50 program and demonstrates a new Cavity Ring Down spectrometer that studies material degradation from UV exposure and gas trace analysis of the low earth orbit environment. Space plasma characterizations will be made via a Langmuir probe.**
- **ODU and VT to provide ground tracking. Student exchanges planned. Awaiting last signature (from CNES) for required U.S. Department of State Technical Assistance Agreement.**
- **Launch as early as end of 2015 on a Ukrainian rocket from a commercial spaceport in Brazil.**

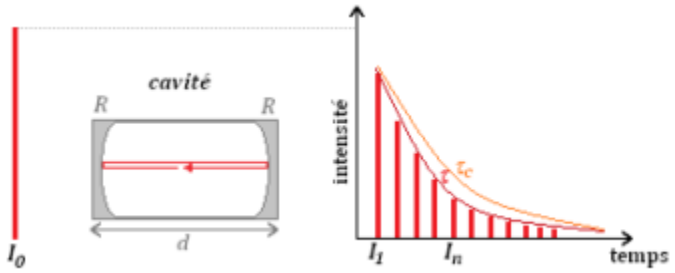


OGMS-SA

The mission : to demonstrate the reliability of a miniaturized CRDS (*Cavity Ring Down Spectrometer*) in space







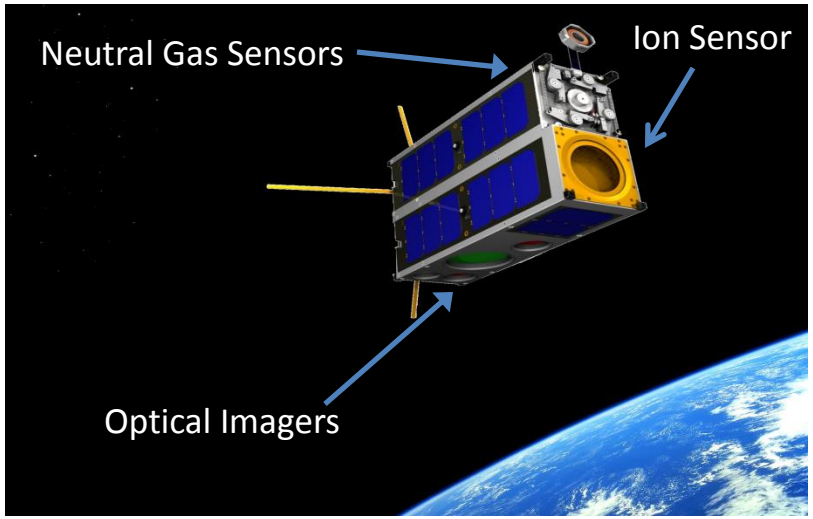
Secondary Payload :

Multi-Needle Langmuir Probes

Space @ Virginia Tech
Center for Space Science and Engineering Research

LAICE – Mission Details

Lower Atmosphere/Ionosphere Coupling Experiment



6U Cubesat w/ 3 instruments on NASA Manifest

Orbit	300-450 km circular, 45-100°
Data Rate	100 Mb/day
ADACS	5° accuracy, 1° knowledge
Mass	~ 8 kg
Power	S/C: 0.98 W, Payload: 3.45 W

Mission Overview:

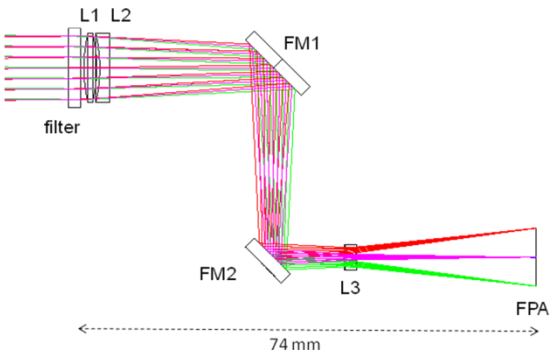
1. Mission will measure effects of terrestrial weather systems on the LEO space environment.
2. Data downlink through NASA Wallops, command uplink through VT and Illinois.
3. Partners: U of Illinois, The Aerospace Corporation, NorthWest Research Associates.
    1. Principal investigator at VT.
    2. Science operations center at VT, mission operations center at Illinois.

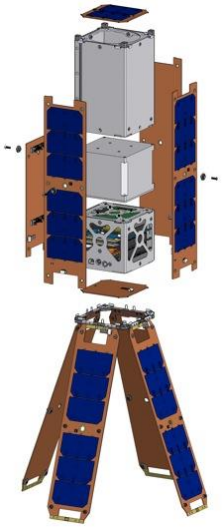
Current Status:

1. First 6U system funded through the NSF CubeSat program.
2. Seed funding provided by VSGC prior to the NSF award.
3. Also selected for deployment from the ISS through NASA's ELaNa program – scheduled launch in April 2016.
4. Instruments now being designed, built and tested by students at VT.
5. 22 students at VT have already been involved in LAICE; *many of these have received VSGC support*.

Space @ Virginia Tech
Center for Space Science and Engineering Research

DUst Sounder and Temperature Imager Experiment - DUSTIE





3U Cubesat w/ 1 instrument on NASA Manifest

Orbit	>500 km km circular, i=30-100°
Data Rate	4 Gbits /day
ADACS	0.5° 3σ Control & Knowledge
Mass	3.15 kg
Power	4W Required, 15W Generation

Mission Overview:

1. Measure cosmic dust as tracer of global dynamics and climate change.
2. Demonstrate instrument suite and attitude determination & control system (ADCS) – many future applications re- Earth science.
3. Develop sophisticated ADCS algorithms for accurate solar pointing.
4. Uplink and downlink using ground-stations at VT and elsewhere.
5. Partners: HU, NRL, USU/SDL, GATS

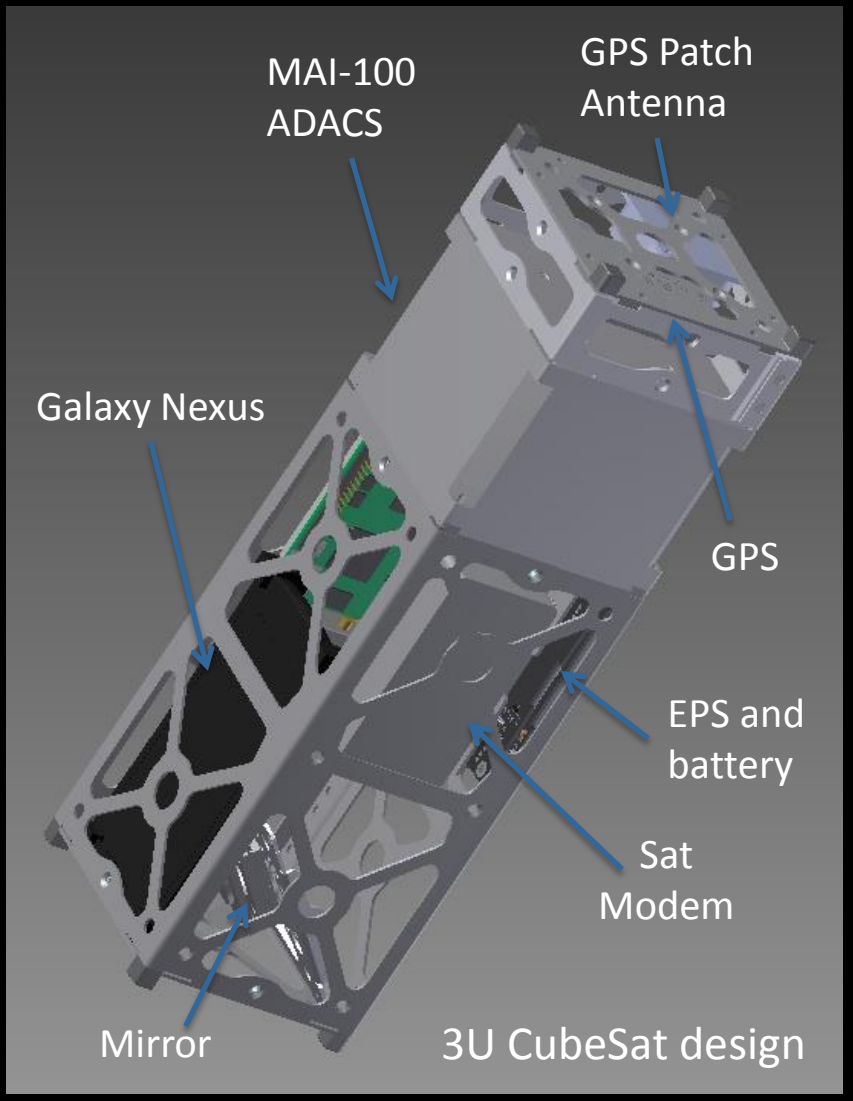
Current Status:

1. Selected for launch through NASA's ELaNa program, but no funding yet identified for payload and instrument development.
2. Optics designed, detector purchased and in-house.
3. S/C bus purchased from Pumpkin Inc.
4. Need communication system and development funds to finalize instruments and software.

VSGC Seed Funding Supported UVA JefferSat

- Can a smart phone be used for sensing and control on a satellite?
- Student design, build and fly small sat
- NASA funding for high altitude balloon flight

Samsung Galaxy Nexus



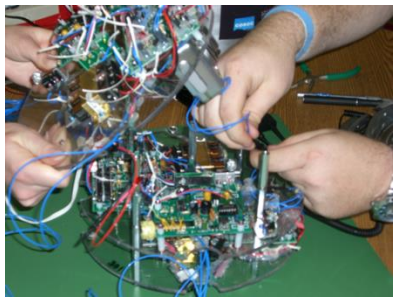
JEFFERSAT

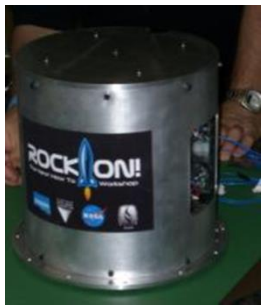
Other Student Flight Projects

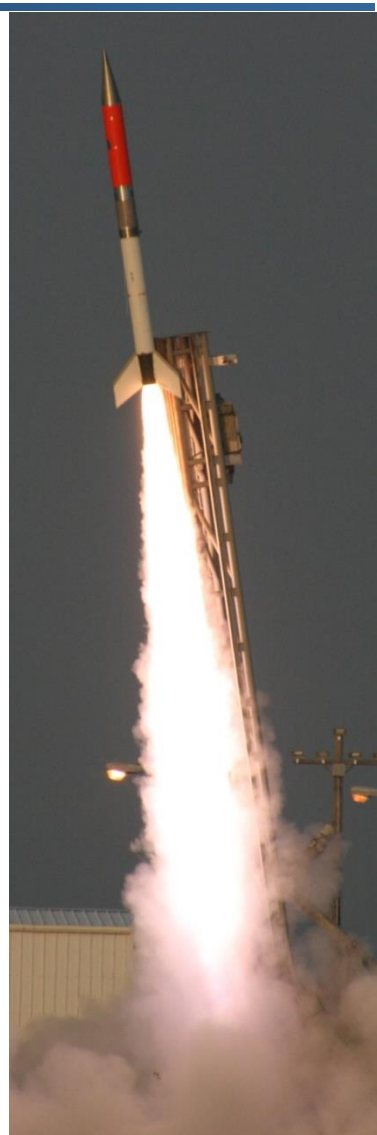
- **Support for ODU Small Satellite Technology Laboratory (2011-13) – 14 students**
  - **Senior design project "System for Data Acquisition and Transmission over a Cellphone Link"; Prototype of a CubeSat de-orbit device; Power system for nano-satellite**

RockOn!

- Colorado Space Grant, Virginia Space Grant and NASA Wallops collaboration. National audience.
- Six-day hands-on workshop held each June since 2008 for faculty and students. >280 participants to date
- Small teams build a sounding rocket payload from a kit.
- Payloads stacked and launched on a two-stage Terrier-Orion rocket on day 6. Payloads launched and retreived.
- VSGC has sponsored teams from VT, UVA, HU and ODU.
- More sophisticated flight opportunities follow on RockSat-C and RockSat-X.
- More than 33 participating schools have integrated sounding rocket payloads into their curriculum







VSGC Supported Sounding Rocket Payloads

Aperture Cover Release Mechanism (ACRM)

Rock Sat 2014 (delayed until 2015)

Objective

Test deployment of instrument cover release mechanism for LAICE Cubesat

Virginia Tech Virtual Reality Experiment (VRE)

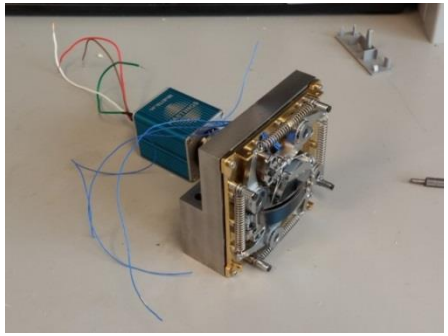
Rock Sat 2014 (delayed until 2015)

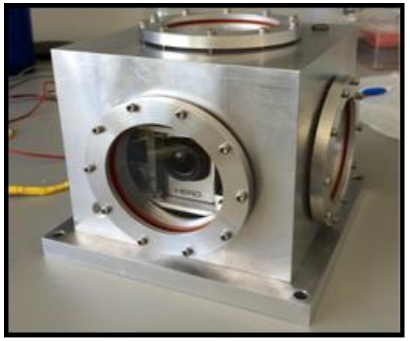
Objective

Record high definition panaromic video of Rocksat-X mission

Plus advanced Nitrous Oxide Sensor

18 students





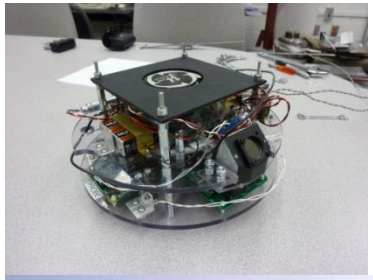
Hy-V – Scramjet Component Testing

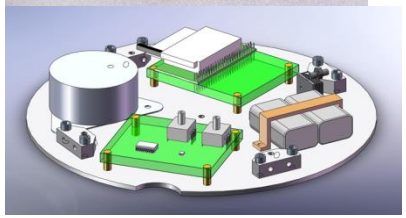
Virginia Tech and UVA

RockSat 2008/2009

Nitrous Oxide Sensor

RockSat 2010/2011





UVA IR Sensor/Rocket Project

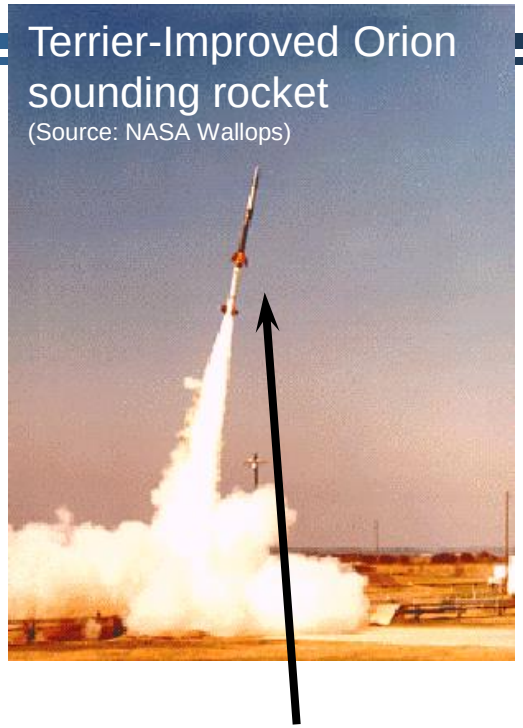
-Student-designed payload aboard an Orion sounding rocket at NASA's Wallops facility.

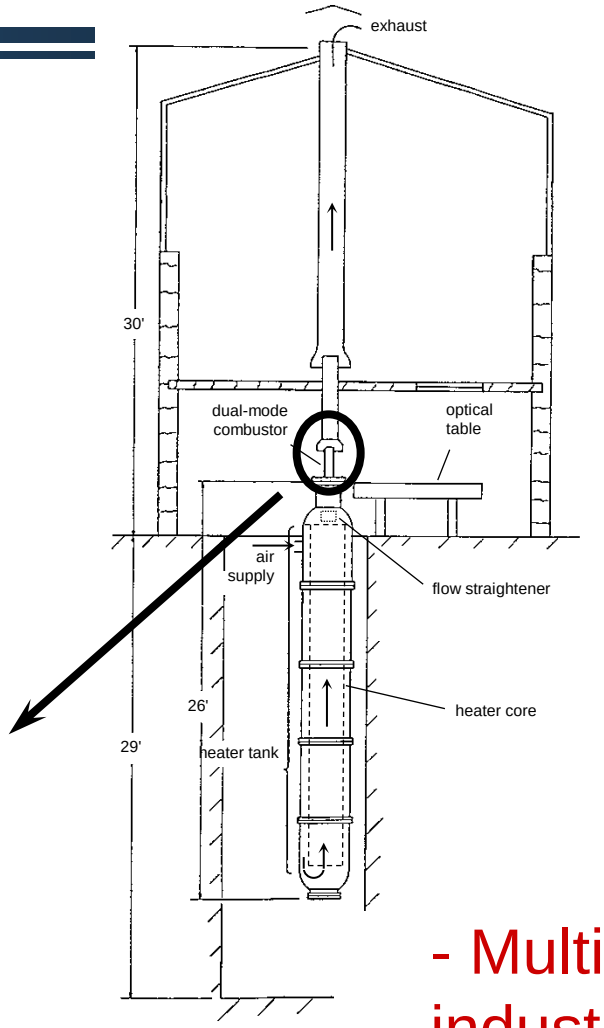
-A cooperative undergraduate internship program between Litton PRC, a Northrop Grumman Corporation company; the University of Virginia (UVA), Virginia Space Grant Consortium (VSGC) and NASA

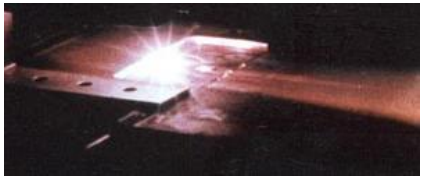
- Infrared (IR) sensing package engineered and built by the undergraduate team to measure environmental effects of poultry waste runoff on the Chesapeake Bay.

-Launches in 2001 and 2003.

VSGC Seed Funding Started Hy-V Program







- Multimillion dollar industrial-academic program

Other Student Flight Projects

Support for ODU Monarch-One RockSatC payload for launch in 2015

- **Demonstrate effective low-power communication, data acquisition and storage utilizing the tracking ODU ham radio antenna and associated ground station.**
- **Demonstration of radio communication capabilities can be utilized by orbiting nanosatellites in anticipation of a Virginia Space Grant Consortium collaboration supporting a French CubeSat project.**
- **Joint project between the ODU ECE and MAE Departments will support the VSGC's continued commitment of advancing space programs within Virginia's universities.**

VSGC sponsored Alex Friedman (VT) as Wallops Intern in summer 2013 to help with development of the WFF small sat facility for use by universities.

Jake Tynis (ODU) served as NASA Langley Summer Intern (2012) to support development of Center's SmallSat Lab.

Other Sounding Rocket Projects

Support for Virginia Tech INVENTS community High Powered Rocketry Team for participation in the 2014 – 2015 Space Grant Mid-West High Powered Rocketry Competition.

Two sounding rocket projects, Colorado Space Grant and Virginia Space Grant partnerships, both launched from NASA Wallops - C-SOAR (1992) and C-SHARP (1994)

- **Managed and built by students**
- **C-SOAR was first student-managed sounding rocket mission ever undertaken with NASA**
- **VSGC partners: ODU, HU, WFF, and LaRC**
- **Five CSGC university partners**
- **Payloads measured ozone density in the atmosphere and compared the data with data from NASA's Stratospheric Aerosol and Gas Experiment**

NASA High Altitude Student Platform Missions
Virginia Tech/VSGC Supported

MIL

- Magnetic Investigation of Luna

Produce a complete system design and mission analysis for a mid-sized spacecraft to conduct the following investigations of the Moon:

Magnetic field

Gravitational field

Topography mapping

(10 students)

FIREFLI

- Flying Infrared Experiment For Lunar Investigation

Proof-of-concept for a potential NASA lunar mission

Observe heating and cooling rates

Surface composition through thermal properties

(18 students)

ARTEMIS

- Academic Research Team for the Establishment of Lunar Magnetic Fields

Magnetic field information leads to knowledge of lunar crust composition

(10 students)

VSGC's Upper Atmospheric Research Balloon Missions

- Two successful university student-managed Upper Atmospheric Research Balloon projects from NASA Wallops involving 150 students and 12 faculty. Instruments measured atmospheric constituents.
- Support from NASA Student Launch Program and VSGC.
- Eagle Aeronautics and Space Tech provided technical advisors for 1st mission.
- Ashtech provided GPS equipment and payload development advice for 2nd mission.
- NASA Langley provided testing and consulting and NASA Wallops provided launch and mission support.
- ODU, HU and College of William and Mary

ODU Ground Station

EQUIPMENT

- EA4TX ARS-USB Rotator Controller Interface used for controlling the antenna using the computer
- Yaesu G-5500 Rotator
- ICOM IC-910H Transceiver
- M2 Antenna Systems 436CP30 UHF Yagi Cross-Polarized Antenna
- M2 Antenna Systems 2MCP14 VHF Yagi Cross-Polarized Antenna

CAPABILITIES

Modes: AM, Wideband FM, FM-Narrow Band, CW

Receive Range: 136 – 174 MHz, 430 – 450 MHz

Transmit: 144 – 148 MHz, 430 – 450 MHz

Transmit Power: VHF 100 Watts, UHF 75 Watts

CURRENT OPERATIONS

Currently trying to record images from weather satellites

Plan to receive a transmission from the RockSat-C launch in 2015

Plan to serve as a ground station for LAICE satellite (Virginia Tech Project)

Plan to serve as a ground station for VSGC French cubesat project

Virginia Tech Ground-Station Capabilities

All systems will be based on software defined radio (SDR) technology, and will utilize the GNU Radio SDR Framework.

VHF / UHF System (Amateur Satellite Service):

- Antennas: Double Stack, Crossed Yagis (one pair per band)
- Polarization: RHCP/LHCP (selectable)
- Frequency: 144 – 148 MHz, 420 – 450 MHz
- Power Amplifiers: 160 W on VHF, 100 W on UHF

L/S Band System (Amateur Satellite Service):

- Antennas: 3.0m dish w/ Stepped Septum Feed (S-Band), crossed loop Yagis (L-Band).
- Polarization: RHCP/LHCP (selectable)
- Frequency: 2400 – 2404 MHz (RX-only), 1260 – 1270 MHz (TX-only)
- Power Amplifiers: 120 W on L-Band

4.5 meter Dish System (Radio Astronomy / EME):

- Antennas: Multiple feed types depending on application
- Polarization: Multiple depending on application
- Frequency: 1296 MHz, 2304 MHz, 10.368 GHz (EME); 1420 MHz (RA)
- Power Amplifier: 120 W (1296), 150 W (2304), 15 W (10.368GHz)
- Backup for 3.0m S-Band System

Weather Satellite Systems (RX Only):

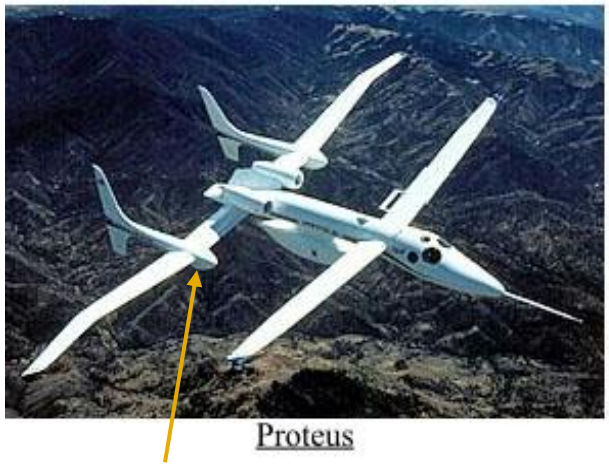
- Antennas: Loop Yagi for GOES satellites, Crossed Yagi for NOAA satellites
- Frequency: 1691 MHZ (GOES), 137 MHz (NOAA APT)

Langley Research Center

MicroMAPS

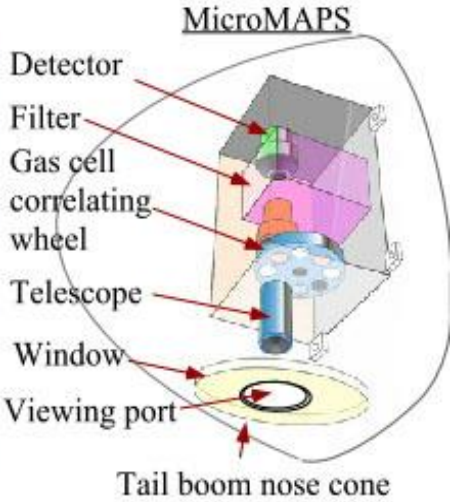
Virginia Space Grant Consortium

- Langley-sponsored instrument was originally built for the canceled Clark spacecraft to measure carbon monoxide in the troposphere.
- VSGC engaged university student teams (UVA, VA Tech, ODU) to make MicroMAPS an operational research tool and to develop partnerships and build the scientific workforce of the future via hands-on aerospace development.
- More than 300 flight hours on the high altitude Scaled Composites Proteus aircraft successfully demonstrated a science measurement prototype in a UAV environment.
- VSGC highly leveraged NASA LaRC funds with other funding sources.



Proteus

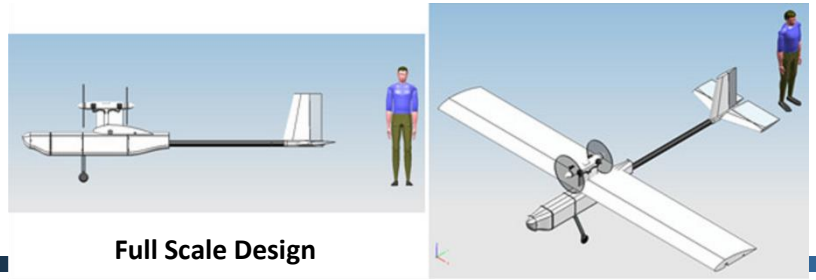
MicroMAPS



The payload package was based on a student design.

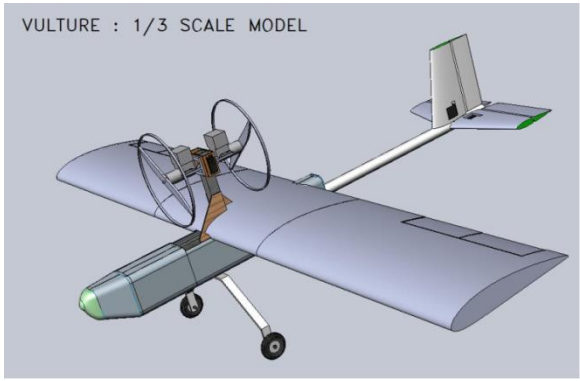
- Ten faculty members and 55 graduate and undergraduate students, under oversight from NASA LaRC, have worked on MicroMAPS. Work ranged from data reduction algorithms, through thermal analysis, package layout and hardware selection, to techniques for geo-referencing the flight data.

Reliability in Unmanned Aerial Systems



Full Scale Design

- Naval Air Systems Command (NAVAIR) through VSGC tasked students at Virginia Tech and Loughborough University to design a highly reliable UAV for large crowd surveillance.
- Evaluate and validate the design by building and testing a one-third scale model. NAVAIR requirements included reliability criterion of fewer than 1 failure per 100,000 flight hours. $200K award.
- The team completed the design of the aircraft, Vulture, during the 2007 -2008 academic year. Prototype in 2008 – 2009. More than 30 undergraduate students participated.
- In addition to construction and flight testing, individual components that are commonly used in UAVs were tested to obtain failure rate data.
- The data and lessons obtained from these studies were incorporated into a full-scale prototype of the modified design.



One Third Scale Model

Reliable UAV in Flight

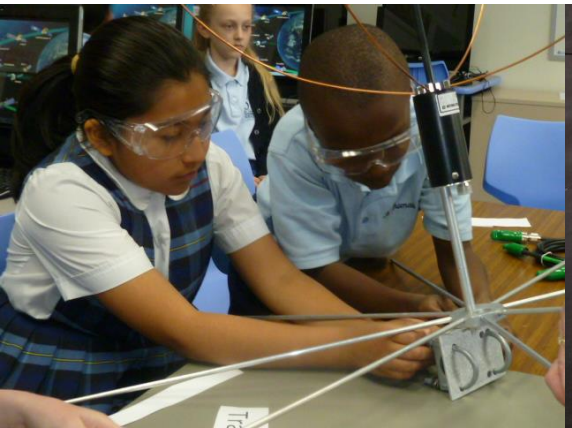
Microgravity Research

- VSGC has supported one team from ODU and two teams from the UVA for MicroGravity experiments via NASA and commercial flight opportunities.

Old Dominion University Student Maria Liberto

Precollege Student Flight Projects

- Thomas Jefferson School for Science and Technology's SOAR (Strategic Outer-Atmospheric Aerial Reconnaissance) project (25 students)
  - Develop UAV and launch from weather balloon or rocket
  - VSGC funding was used to source parts and supplies
- St. Thomas More Cathedral School (entire K-8 school/43% minority)
  - Supported cubesat project on Orb4 to ISS from Wallops in 2015
  - NASA CubeSat Launch Initiative (Mission ELaNa-IX)
  - Earth observation and asteroid detection cameras
- Supported Wise County 'Ad Astra to the Stars' team to participate in Team America Rocketry Competition (2012)
  - 30 students from 6 schools attending Wise County Career Technical Center



Precollege Student Flight Projects

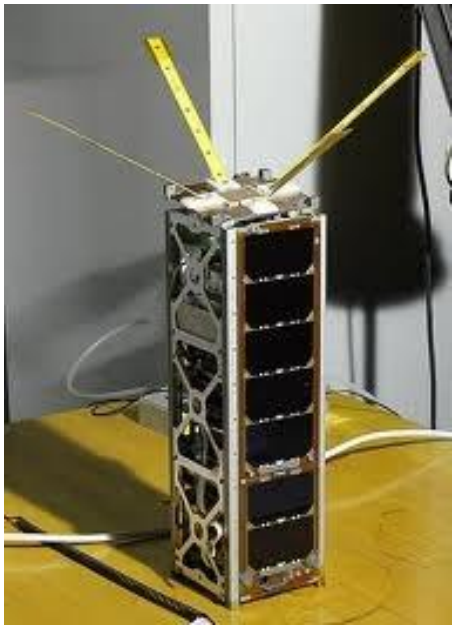
- Russell County Public Schools participation in the Student Spaceflight Experiments Program (SSEP) (2012-13)
  - 7 schools, 83 students, 25 projects submitted, one project flown on SSEP 2 (incorrectly activated); successful re-flight from Wallops on SSEP 3
- Wise County Public Schools participation in the SSEP (2012-14)
  - School-division wide participation; science payload flown on SSEP Mission 3b

International (ISS) Space Station Downlink

- VSGC provided funding to support the Wise County live in-flight downlink with astronauts aboard the ISS (2012)
- Hosted at UVA-Wise, on-site presentations by a NASA and a commercial astronaut
- Impacted over 5,000 participants

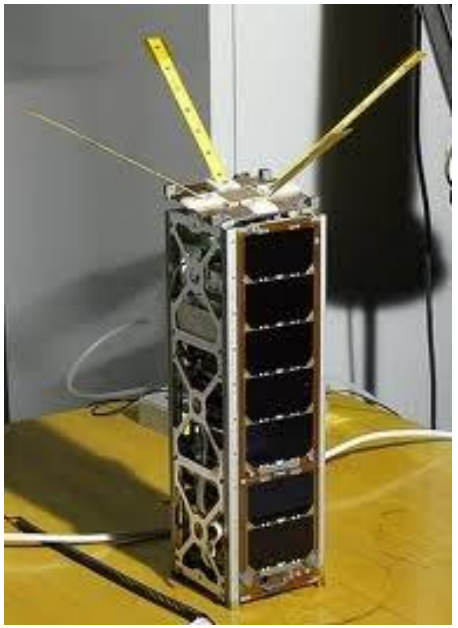
Small Satellite Working Group

- **VSGC established a Small Satellite Working Group in 2011 for networking, to plan for anticipated calls for proposals for small satellite initiatives, and to seek collaborative activities.**
- **Members currently include Virginia Tech, UVA, Old Dominion University, Will and Mary, Hampton University, NASA Langley and NASA Wallops.**
- **Highly collaborative group.**
  - **Sharing of information and resources**
  - **Awareness of flight and funding opportunities**
  - **Ongoing communication and quarterly meeting**
  - **Working together on VSGC French cubesat initiative**
  - **Planning for participation in Space Grant Solar Eclipse 2017 project**



Potential to Support a State Nanosatellite Initiative

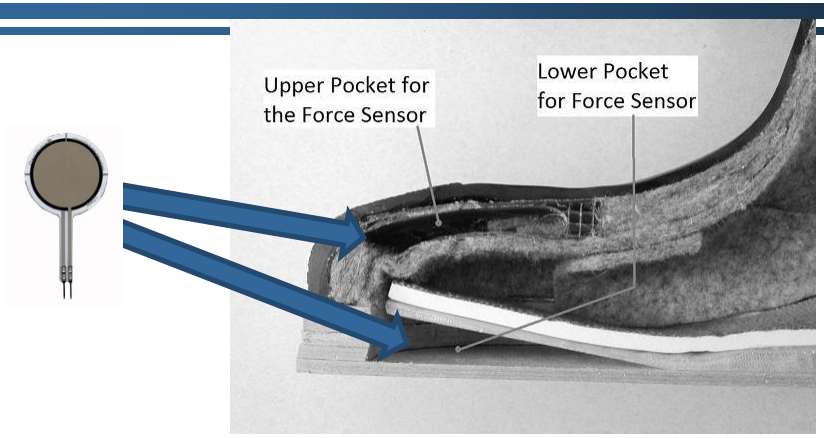
- **VSGC is well poised to lead a state-wide nanosatellite initiative.**
- **Could expand existing Small Sat Working Group**
- **Reach out to other universities, aerospace organizations and industry**
- **Established infrastructure already includes NASA organizations and state university leaders in small sats**
- **Flexible fiscal arrangement**
- **Success track record in state-wide, national and building**
- **International partnerships**



- VSGC sponsors Virginia Tech Team for Wearable Technology Projects at Johnson Space Center (2013, 2014, 2015)

- Undergrads in Architecture, Computer Science, Industrial Design, Electrical and Computer Engineering

Example projects



In-boot jetpack controller

Cargo bag radiation shielding garment

Flexible interactive cuff checklist

Noise-cancelling vest

Other Student Flight Projects

Support for Virginia Tech INVENTS community High Powered Rocketry Team for participation in the 2014 – 2015 Space Grant Mid-West High Powered Rocketry Competition.

Sponsoring student payload course development and RockSat Payload for Eastern Shore Community College. Courses in 2015-2016 academic year; launch in summer 2016.

Other Student Flight Projects and Support

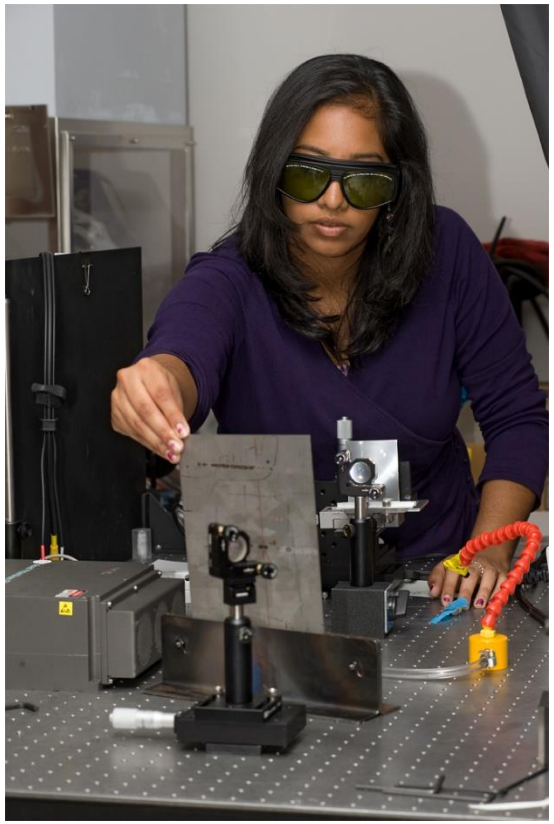
- Students for the Exploration and Development of Space (SEDS) at ODU
  - Supported students to attend 2013 Space Vision Conference in Arizona
  - Supporting team to develop rocket and science payload for competitions with South Eastern Virginia Rocketry Association (SEVRA) (2014-15)
- Supported Development of a Joint Senior Design Cubesat Project
  - Virginia Tech and Interamerican University, two semester project
  - Space Weather using Ion Spectrometer and Magnetometer (SWIM)

Fellowships and Scholarships

VSGC Scholarships/Fellowships

Since 1989, the VSGC has awarded $5,983,178 in support to 1,432 students (including renewals) at Virginia's Space Grant institutions.

- Undergraduate Research Scholarships -- $1,869,289 to 258 students ($8,500 award)
- Graduate Research Fellowships -- $3,576,389 to 717 students ($5,000 renewable award – University match of $5,000 to $10,000)
- Community College Scholarship -- $225,000 to 144 students ($2,000 award)
- Undergraduate STEM Scholarship -- $151,500 to 152 students ($1,000 renewable award)
- Teacher Education Scholarships -- $161,000 to 161 students (no longer available)
- Funding provided by NASA Space Grant and the Commonwealth



The Annual VSGC Student Research Conference and Luncheon

- **Hosted each spring (required attendance by VSGC scholars and fellows). President of each VSGC university hosts in turn.**
- **Graduate Research Fellows and Undergraduate Research Scholars present their research to faculty, NASA, business and industry representatives.**
- **2015 Conference (April, date TBD) will be hosted by Virginia Tech**

Internships

More than 5,000 students placed in paid internships with NASA, federal labs and industry.

Commonwealth STEM Industry Internship Program

Implemented and Managed by the Virginia Space Grant Consortium (VSGC)

Virginia Space Grant Consortium

What is CSIIP?

CSIIP
COMMONWEALTH STEM INDUSTRY INTERNSHIP PROGRAM

A free online system matching undergraduate STEM students to more than 145 companies throughout Virginia that offer paid internship opportunities.

Offers spring, summer, and fall internship opportunities

Offers companies a sophisticated, highly searchable database of more than 850 complete application packages to help them find an intern with the right skills

Funded by the Commonwealth of Virginia. Managed by the Virginia Space Grant Consortium.

STEM = **Science**, Technology, Engineering, Math

Commonwealth STEM Industry Internship Program

One Application - 145+ Companies throughout Virginia

CSIIP

COMMONWEALTH STEM INDUSTRY INTERNSHIP PROGRAM

Pilot year (2012-2013):

- 10 Partner Organizations
- 500 student applicants
- Placed 53 interns
- With 29 companies

Second year (2013 – 2014):

- 14 Partner Organizations
- 850 student applicants
- Placed 77 interns
- With 40 companies

Third Year (2014 -2015)

- 18 Partner Organizations so far – Added 3 new key partners (NCI, CCAM, Virginia Bio). SVHEC also recently registered.
- Anticipate:
  - More than 100+ placements anticipated
  - 145+ companies are registered.

Current CSIIP Partners

Virginia
Space Grant
Consortium

CSIIP
COMMONWEALTH STEM INDUSTRY
INTERNSHIP PROGRAM

Langley Aerospace Research Summer Scholars (LARSS) Program

- Encourage high caliber college students to pursue and earn graduate degrees.
- Enhance student interest in aerospace research by introducing them to the professional research resources and facilities of LaRC.
- Continue to feed the NASA pipeline and the Nation's STEM skills base with highly qualified undergraduate and graduate students.
- NASA/NIA/VSGC partnership
- Total number of students placed 1979

NASA Undergraduate Student Research Program

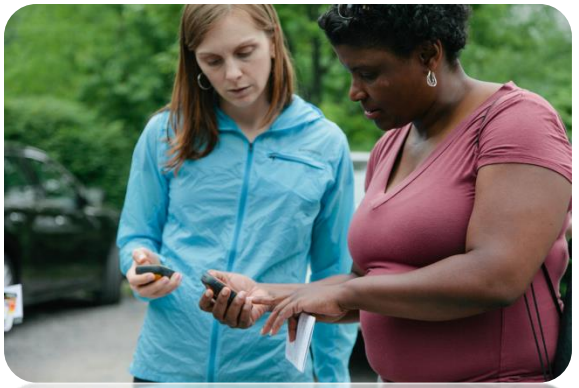
- **Developed for NASA and managed by VSGC from 2000 through 2007.**
- **Extremely successful program.**
- **845 undergraduates placed through 2007.**
- **71 students through Space Grant sponsorships.**
- **296 different institutions;**
  - *26% underrepresented minorities*
  - *41% females.*
- **Placements at all NASA Centers, Wallops Flight**
- **Facility, White Sands Test Facility, Los Alamos National Laboratory and National Renewable Energy Lab.**

National Partnerships included:

- *National Space Grant Foundation*
- *Council on Undergraduate Research*
- *American Association of Community Colleges*
- *National Society of Black Engineers.*

Geospatial Technology

- **VSGC established the Virginia Geospatial Extension Program at Virginia Tech through a NASA Workforce Development Grant.**
  - Virginia Geospatial Extension Agent, Dr. John McGee, is now a tenure-track faculty in the College of Natural Resources
- **Three NSF-Advanced Technology Education grants to support geospatial academic pathways and workforce development in partnership with Virginia Tech and Virginia's Community Colleges (GeoTEd)**
  - Workforce Needs Analysis
  - Faculty Institutes for faculty from six-state region
  - High School Teacher Workshops
  - Mobile apps; Career Awareness.
- **Partnering with NASA Langley (Mary Gainer) to provide new fieldwork courses where students map and monitor trees and other environmental and historical artifacts.**



GeoTEd
geoted.org

Geospatial Technology

- **Managed NASA Langley's GIS Internship Program from 2008-2011**
  - National recruitment for full and part-time internships year round
  - Students mentored by Mary Gainer
  - Some support for JPL and Marshall
  - Placed nearly 100 interns in paid positions – Many from Virginia Tech
- **VSGC GEOTREK-12 program provides precollege teachers with training and support to implement geospatial technologies in the classroom**
  - Trained over 750 teachers since 2000

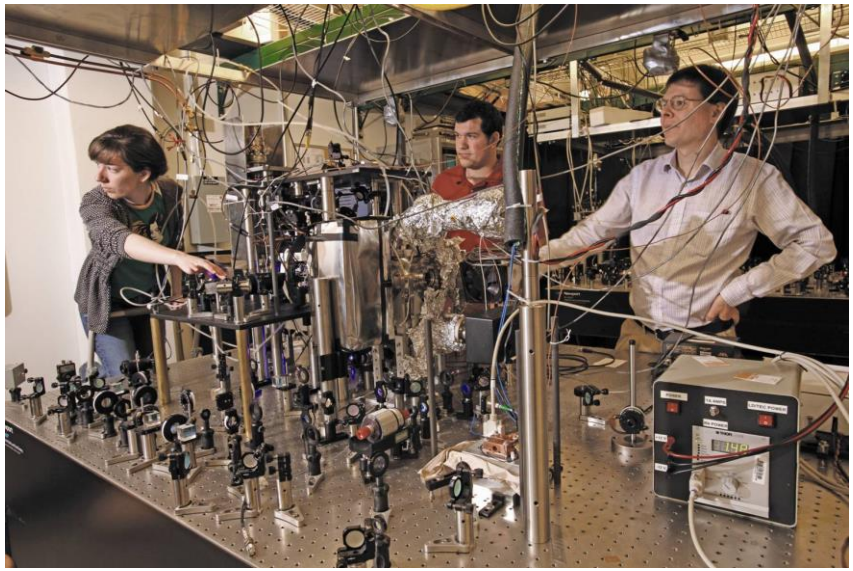
GEOTREK-12

Faculty Programs

New Investigator awards, funding for conference travel and new course development

New Investigator Program

- **Designed to strengthen Virginia's aerospace-related infrastructure by providing start-up funding to university faculty who are conducting research aligned with NASA's mission.**
- **To date, $230,000 awarded to 23 faculty members.**
- **Research aligned with full range of NASA's missions and activities.**
- **Targeted to tenure track faculty within first five years of academic career.**



Seth Aubin (R), Assistant Professor of Physics at the College of William & Mary, graduate students Megan Ivory (L) and Austin Ziltz.

NASA Faculty Fellowship Program (NFFP)
Langley Faculty Fellowship Program (LFFP)

- VSGC managed faculty fellowship programs in summer 2006.
- NASA eliminated program funding in 2007.
- 13 faculty participated in 10-week summer session.
- Fostered research collaborations between the university faculty member and the NASA researcher.
- Enhanced faculty pedagogy and facilitated interdisciplinary networking.
- Provided on-site management for logistics, stipend payment, tours, lectures and travel.
- 10 universities represented (3 HBCU's).
- Pending proposal for Langley University Research Initiative for faculty and student research fellowships.
- VSGC also sponsored community college faculty fellowships in mid-1990's -10 awardees.

Programs for the National Academies

GRADUATE RESEARCH AWARDS

For Applied Research in Public-Sector Airport-Related Aviation Issues

Airport Cooperative Research Program (ACRP)

AWARDS:
- Up to 10 awards of $10,000 each for one year.
- Sponsored by U.S. DOT Federal Aviation Administration, administered by the Transportation Research Board's ACRP and managed by Virginia Space Grant Consortium.

APPLICATION REQUIREMENTS:
- Cover Page Form from Sponsored Program Office
- Electronic plus 1 Hard Copy Submission
- 2 Letters of Recommendation
- Research Advisor Statement
- Official Transcripts
- Research Proposal
- Writing Sample

RECOGNITION:
- Winners present final research papers at Transportation Research Board Annual Meeting.
- Papers are considered for publication as part of the Compendium of Papers for the meeting, and considered for publication in the Transportation Research Record.

INQUIRIES DIRECTED TO:
Virginia Space Grant Consortium - ACRP@odu.edu
(757) 766-5210 (e-mail is preferable)

ELIGIBILITY:
- Open to students who are U.S. or Canadian citizens, permanent residents, or current student visa holders.
- Must be enrolled full-time in a graduate degree program at an accredited institution of higher learning during the 2015-2016 academic year.

APPLICATION DEADLINE:
May 15, 2015

For more information and to find out how to apply, please visit: http://www.trb.org/ACRP/ACRPGraduateAwardProgram.aspx

TRB TRANSPORTATION RESEARCH BOARD

Airport Cooperative Research Program

University Design Competition for Addressing Airport Needs

2014 – 2015 Academic Year

Introduction

The Airport Cooperative Research Program (ARCP) is sponsoring a national competition for universities that engages students in addressing issues relating to airports and the National Airspace System. This Competition challenges individuals and teams of undergraduate and/or graduate students working with faculty advisors to consider innovative approaches related to these challenges. Submitters should design solutions that focus on addressing airport issues and constraints involving the following issues: administration, environment, legal, airport-established policy, planning, safety, human resources, design, construction, maintenance, and operations at airports, and develop innovative approaches to improve the management, safety, capacity and efficiency of the nation's airports.

This Competition focuses on design solutions addressing the above issues in the following broad areas: Airport Operation and Maintenance, Runway Safety/Runway Incursions/ Runway Excursions, Airport Environmental Interactions, and Airport Management and Planning. Background and some specific challenge areas are defined in the Technical Design Challenges section. Students are not limited to the suggested topical areas listed. They are free to propose design solutions based on other topics that fit the four broad challenge areas. As part of the required literature review, participants are encouraged to explore past ACRP research reports to see what ideas have already been presented and studied.

Competition Goals:

1. Raise awareness of the benefits of the Airport Cooperative Research Program and the importance of airports to the National Airspace System infrastructure.
2. Increase the involvement of the academic community in ACRP and addressing airport operations and infrastructure issues and needs.
3. Engage students at U.S. colleges and universities in the conceptualization of applications, systems and equipment capable of addressing related challenges in a robust, reliable and comprehensive manner.
4. Encourage undergraduate and graduate students at U.S. colleges and universities to contribute innovative ideas and solutions to issues facing airports and the National Airspace System.
5. Provide a framework and incentives for quality educational experiences for university students.
6. Develop an awareness of and an interest in airports as vital and interesting areas for engineering and technology careers.

The Competition website is the participant's source for complete and up-to-date information:
vsgc.odu.edu/ACRPDesignCompetition

TRB TRANSPORTATION RESEARCH BOARD OF THE NATIONAL ACADEMIES

FAA Design Competition for Universities
2007 - 2014

Managed by: Virginia Space Grant Consortium

Goals:

- Raise awareness of the importance of airports to the National Airspace System Infrastructure.
- Increase the involvement of the academic community in addressing airport operations and infrastructure issues and needs.

263 design proposals
1,354 student participants
1,331 student participants on teams
23 individual participants
66 participating universities
95 participating faculty members

- Engage undergraduate and graduate students at U.S. colleges and universities in the conceptualization of applications, systems and equipment capable of addressing related challenges in a robust, reliable and comprehensive manner.
- Encourage undergraduate and graduate students at U.S. colleges and universities to contribute innovative ideas and solutions to airport and runway safety issues.
- Provide a framework and incentives for quality educational experiences for university students.
- Develop an awareness of and an interest in airports as a vital and interesting area for engineering and technology careers.

http://faadesigncompetition.odu.edu

Virginia Space Grant Consortium
600 Butler Farm Road, Suite 2200, Hampton, VA 23666 ◇ Phone: 757-766-5210

STEM TAKES FLIGHT
at Virginia's Community Colleges

NEW $499,155 award to VSGC from NASA Headquarters Space Grant Program

- VSGC Funding Some Components

STEM Takes Flight Program Components

- Community College STEM Bridge Scholarships
- Build/Fly/Learn Team Research Experiences at NASA Langley Research Center
- Individual Student Research Experiences at NASA Langley and NASA Wallops Flight Facility
- Industry Internships – Commonwealth STEM Industry Internship Program (CSIIP)
- New Multi-disciplinary Courses
- Faculty Professional Development at NASA Wallops

Partners: Virginia Community College System (VCCS); NASA Langley Research Center; NASA Wallops Flight Facility; Eastern Shore Community College; Virginia Western Community College; Thomas Nelson Community College; Strong Support from the Governor's Office

Precollege

Precollege Programs

- **Teacher professional development programs have impacted more than 25,000 Virginia Teachers and Counselors.**
- **VSGC has worked with every Virginia School System.**
- **VSGC has led national initiatives such as Solar System Educators for JPL and NASA Student Involvement Program**
- **Many thousands of Virginia students have been VSGC program participants.**
- **All VSGC programs are standards-based and have a strong evaluation component.**

Virginia Aerospace Science and Technology Scholars

Explore where Science, Technology, Engineering, and Math can take you!

VASTS Program Goal

- Promotes exploration of science, technology, engineering, and math (STEM) concepts using a Space Exploration theme

Elements

- Competitive statewide program for high school juniors
- Free of cost
- Online course (2 college credits)
- Summer Academy at NASA Langley Research Center (additional 2 college credits)

Virginia Aerospace Science and Technology Scholars

Explore where Science, Technology, Engineering, and Math can take you!

	2008	2009	2010	2011	2012	2013	2014
Total Participants	48	118	347	420	467	520	505
Males (%)	77	68	68	67	65	62	62
Females (%)	23	32	32	33	35	38	38
Underrepresented Minorities (%)*	11	18	18	14	14	24	17
Career and Technical Education-track Students (%)	30	30	32	36	32	38	32
Virginia Senate Districts Represented (%)	65	90	100	100	100	100	100
Virginia House Districts Represented (%)	41	74	86	86	99	95	93

**Self reported; up to 12% of students have indicated "other"*

Virginia Space Coast Scholars

Funded by the The Commonwealth of Virginia

Since 2012, 1000 students have applied, 400+ served.

Who can apply?

- High-school sophomores
- Virginia and U.S. citizens
- 2.7 GPA minimum
- Demonstrated interest in STEM

2014-2015 500+ applied, 300 to be accepted.

Nov. 2014 – Mar. 2015

- 5 Modules
- CTE Credit
- Features Missions Launched Or served by NASA WFF and MARS
- Earth Science & Aviation Studies

STEM Online Learning Experience

Inquiry-based

Dynamic

Interactive

Project-based

2015 Residential Summer Academies @ NASA Wallops Flight Facility

- **July 25-31**
- **August 8-15**

To date, over 98% Senate and 89% Delegate Districts served.

BLAST

Building Leaders for Advancing Science and Technology

- **Statewide program consists of a three-day, on-campus motivational experience for rising 9th and 10th grade students in Virginia**
- **Free hands-on STEM activities focused on solving engineering challenges and scientific questions**
  - 2013 - 158 students participated (2 sessions)
  - 2014 - anticipate serving over 200 students (3 sessions – 1 at UVA and 2 at VT)
- **STEM Challenges**
  - **Save the Penguins**: Design and build a shelter to protect ice from melting
  - **RaPower:** Design and build a model solar car
  - **Mars Rover**: Design and build a remotely operated robot to explore a far away location
  - **Poisoned Kool-Aid:** Conduct experiments to discover what's in a mysterious liquid
- **Application deadline is February 1, 2014**

GREATER PENINSULA GOVERNOR'S ACADEMY

SCIENCE | TECHNOLOGY | ENGINEERING | MATHEMATICS

- **Engineering Technology Exploratory Saturday Series.**
- **Middle-School Students and Parents.**
- **Goals:**
  - Foundation program to feed Governor's Academy career pathway
  - Motivate students toward careers in engineering technology and STEM
  - Provide hands-on experiences
  - Exposure to real engineering technologists as role models
  - Inform parents about careers in engineering technology and STEM

GREATER PENINSULA GOVERNOR'S ACADEMY

SCIENCE | TECHNOLOGY | ENGINEERING | MATHEMATICS

- **Series Includes Three Themed Saturday Events.**
  - *Designing the Future* (hosted by TNCC)
  - *Connecting the Future* (hosted by Canon Virginia)
  - *Automating the Future* (hosted by NASA Langley Research Center)
- **Since 2008, 20 Saturdays offered.**
- **NASA Langley is a program partner.**
- **1220 students and 1016 parents have participated.**
- **GPGSA partners have contributed significant cash and in-kind support to enable events.**

VSGC Offers

- **Strong track record of outstanding program management and impacts.**
- **Long history of partnerships with NASA, particularly Langley, Wallops and Headquarters, academia and industry.**
- **Existing Small Sat Working Group.**
- **Engagement with national Space Grant network.**
- **Educational nonprofit with highly leveraged resources.**
- **A mission of educational outreach, workforce development and research directly aligned to NASA's mission and strategic plan.**
- **Open to and experienced in partnerships across institutions and organizations.**
- **Extensive aerospace, workforce development and education networks**
- **Extensive experience in student flight programs, workforce development programs, teacher professional development, higher education and precollege programs.**