National Aeronautics and
Space Administration

Reaching Farther

Wallops Flight Facility

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Undergraduate Student Instrument Project Lessons Learned

Wallops and the USIP Mission Management

NASA GSFC Wallops Flight Facility on the Eastern Shore of Virginia

Wallops' Suborbital Platforms

NASA Student Flight Research Opportunity

The Goals of USIP:

- To provide a hands-on flight project experience to enhance the science, technical, leadership and project skills for undergraduate student teams.

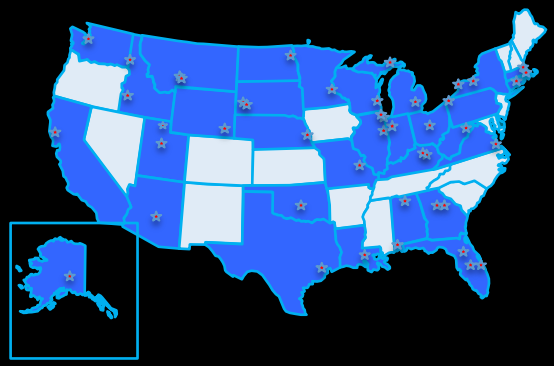
- To fly a science and/or technology investigation relevant to NASA strategic goals and objectives on a suborbital-class platform

Funding Provided By:

- NASA Science Mission Directorate

- NASA Office of STEM Engagement, National Space Grant Program

USIP Awards:



-10 for the First USIP – 10 States

- 47 for the second USIP – 33 States

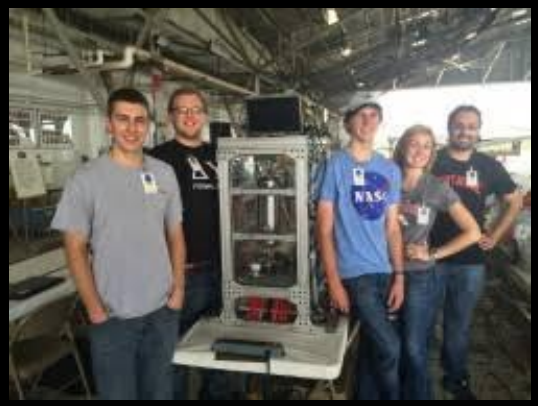
Universities Proposed the Platforms

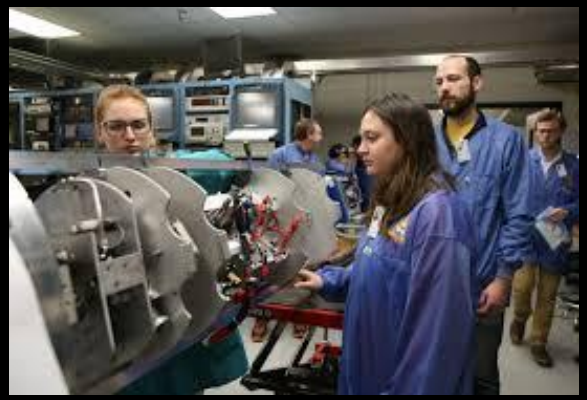
- Competed awards used a mix of suborbital platforms to fly their instruments
- CubeSats worked with the NASA CubeSat Launch Initiative (CSLI) to manifest their flight opportunity.

Platform	First Award In 2012	Second Award In 2016
Sounding Rockets	1	5
Scientific Balloons	3	5
Hand-held Balloons	2	7
ZeroG, sROV	3	5
UAS	1	2
CubeSats	0	23
TOTAL	10	47

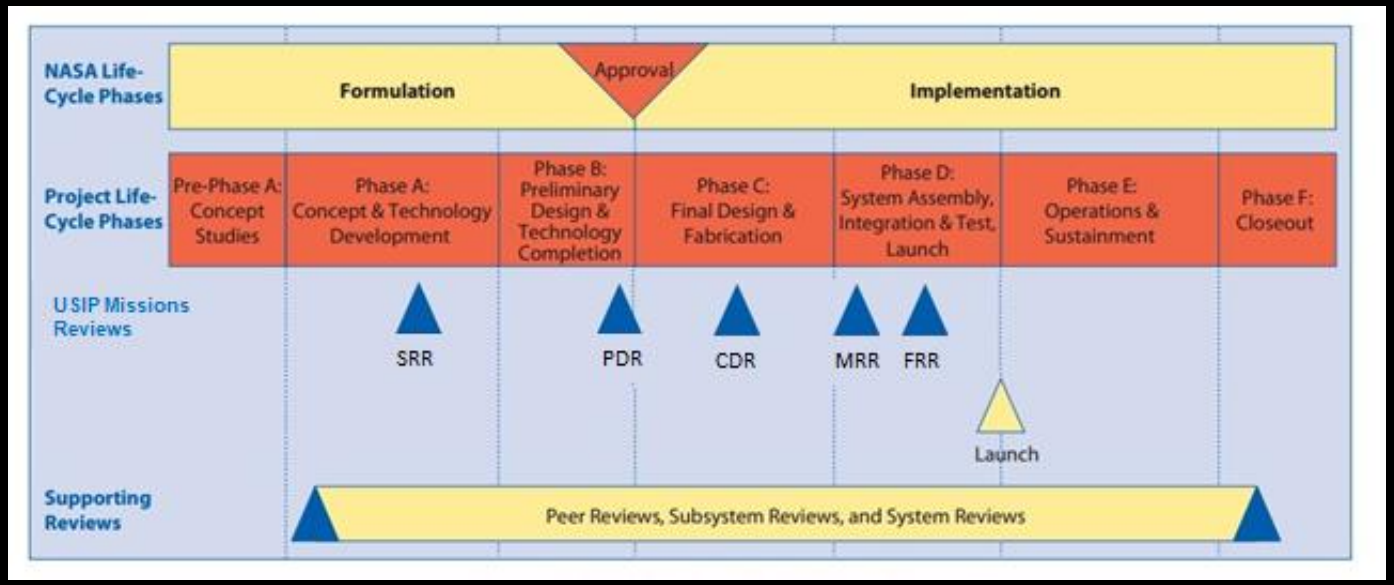
Undergraduate Student Instrument Projects (USIP)

- Teams were multidisciplinary (e.g. science, engineering, business, humanities)
- Students performed the project management functions and instrument development responsibilities
- CubeSat teams launching on ISS-bound vehicles had added requirements including testing, fluid containment, redundancy requirements, and materials compatibility





NASA Project Management Principals



Teams:

- Developed a project plan consistent with NASA project management principles
- Participated in key system concept and design reviews
- Submitted documentation for flight, delivery of the payload to the launch site, analysis of mission data and for submittal of a final project report

USIP Progress as of February 2020

Of the 47 projects awarded 66% have Launched:

7 hand-launched balloon projects have flown at least once. Many have launched several times

4 large Scientific Balloons launched at Fort Sumner

4 Sounding Rockets projects launched in March 2018.

3 Zero-G and 2 sRLV projects are complete

USIP CubeSat Progress as of February 2020

- **11 CubeSat projects have launched – 10 as CSLI payloads, 1 on the second stage of Antares**
- **5 are manifested to launch by September 2020**
- **6 are working technical issues, are still in development, or are awaiting manifesting**

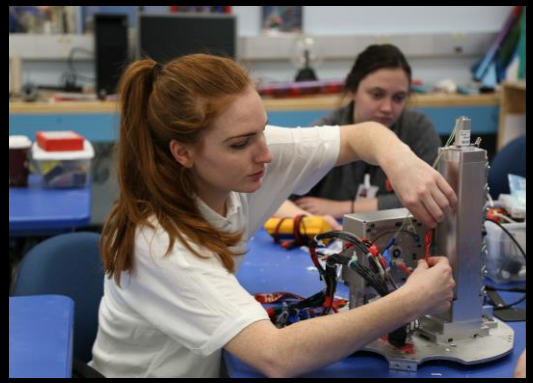
UNITE deployed from ISS February 4, 2019 and is still collecting data

Virginia's CubeSat Constellation was deployed from ISS July 3, 2019

Arizona State University Phoenix CubeSat deployed from Cygnus February 19, 2020

Feedback from Faculty:

- Real-world Problem Resolution
- Teamwork Skills
- An Authentic NASA Educational Experience
- Students Learned from Adversity When Things did Not Work as Expected

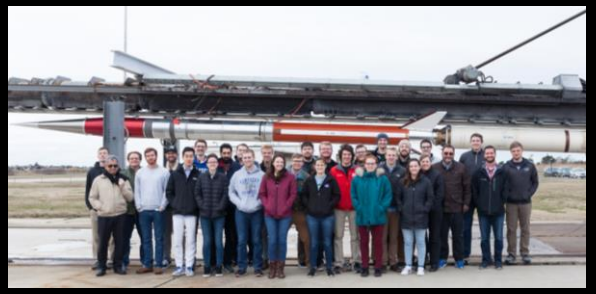


Feedback from Students:

- Life Changing Opportunity
- Do Not Have This Type of Experience in Classroom
- Real-world experience
- Technical Skills Improved
- Learned Engineering Project Management and Communication Skills
- Continued on to Earn Masters Degree

Positive Results:

- Gained experience in leadership, design, test and integration
- Students Were Able to Obtain NASA and Commercial Internships
- Inspired Students to Pursue Majors and Careers in the Aerospace Industry
- Assisted in Obtaining Employment



USIP Challenges:

- Worked Best if USIP was a Credit or Capstone Project
- The Significant Increase in the Number of USIP Teams
- Faculty Support was Needed Throughout the Project
- Teams Needed Additional Guidance and Templates from NASA.

Conclusions From USIP:

- Encourage More Communication and Collaboration Between USIP Teams Using the Same Platform
- Faculty Quote: “It is extremely rare for undergraduate engineering students to gain experience beginning from conceptual design and proceed through testing and delivery.”
- Student Quote: “It’s one way of creating innovative independent engineering minds rather than just job ready individuals…”
- “The required rigor and accountability they were held to by NASA at WFF and the mentors gave them an appreciation of professional expectations, and built their confidence in their ability to understand and contribute meaningfully to a real world project.”

NASA Student Flight Research

NASA Provides a Continuum of Opportunities:

- RockOn!, RockSatC, RockSatX - Colleges
- HASP - Colleges
- CubeSat Launch Initiative (CSLI) – Universities
- Cubes in Space – Elementary, Middle, High School
- ThinSats – Elementary & Middle School

Questions?