Collaborations Between Space Grant Lead Institutions and NCESSE / Clarke Institute
Successes and New Opportunities

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National Center for Earth and Space Science Education (USA)
http://ncesse.org

Arthur C. Clarke Institute for Space Education (International)
http://clarkeinstitute.org
The Student Spaceflight Experiments Program (SSEP) is a program of the National Center for Earth and Space Science Education (NCESSE) in the U.S., and the Arthur C. Clarke Institute for Space Education internationally.

SSEP is enabled through a strategic partnership with NanoRacks, LLC, working with NASA under a Space Act Agreement as part of the utilization of the International Space Station as a National Laboratory.
What is the Student Spaceflight Experiments Program?

Created to Address U.S. Strategic Need:

• high caliber STEM education program for grades 5-14 tuned to next generation national science education standards;

• designed to be a national pedagogical model for inspiring and engaging the next generation of American scientists and engineers, and addressing science literacy

Breaking New Ground in Commercial Space:

• SSEP is the first pre-college STEM education program that is both a U.S. national initiative and implemented as an on-orbit commercial space venture.
Track Record

8 SSEP flight opportunities have been undertaken since program inception in June 2010; SSEP on STS-134 and STS-135; and SSEP Missions 1 through 6 to ISS

68 communities have participated; 93 community programs undertaken; NCESSE secured funding for 77 of 93 programs; 350+ Local Partners

Data available through the first 7 opportunities:

28,600 grade 5-14 students across 600 schools fully immersed in microgravity experiment design and proposal writing;

5,090 flight experiment proposals received from student teams;

58 experiments have flown; 23 experiments flying in December 2013; 15 experiments flying Spring 2014

3 Conferences at NASM
Deep Investment in Partnership:

Local Partners
over 350 Local Partners to date, including: school districts, private schools, 22 NASA Space Grant colleges and universities, businesses, foundations, private philanthropists, and local research institutions providing science advisors.

National Partners
The Smithsonian National Air and Space Museum, Center for the Advancement of Science in Space (CASIS), Carnegie Institution of Washington, NASA Nebraska Space Grant Consortium, and Subaru of America, Inc.
SSEP Community Network
Partnership Profile #1: Howard County, Maryland
1 of 17 Mission 3 to ISS Communities

Experiment Design Competition:
  Number of Students Fully Engaged in Experiment Design: 550
  Number of Student Team Proposals Received: 90

SSEP Community-wide Engagement Program (includes mission patch design):
  1,600 grade 6-8 students given opportunity to participate

Partner Institutions:

  Howard County Public School System

  **Maryland Space Grant Consortium**
  MdBio Foundation
  J. Craig Venter Institute
Partnership Profile #2: Downingtown, Pennsylvania
1 of 11 Mission 4 to ISS Communities

Experiment Design Competition:
Students Fully Engaged in Experiment Design: 400
Student Team Proposals Received: 75

SSEP Community-wide Engagement (includes mission patch design):
12,000 grade K-12 students given opportunity to participate

Partner Institutions:

Downingtown STEM Academy, Downingtown Area School District

West Pharmaceutical Services, Inc.
Bentley Systems, Inc.
Subaru of America, Inc., SSEP National Partner
NASA Pennsylvania Space Grant Consortium
Center for the Advancement of Science in Space (CASS), SSEP National Partner
Litts Quality Technologies (LQT)
Analytical Graphics Inc. (AGI)
Trans Lunar Designs
AbsolutData
The SI Organization
Morphotek
SSEP on STS-134
Final Fight of Shuttle Endeavour

Launch: May 16, 2011

Payload: *Eagle* (SSEP1), 16 SSEP experiments

Connecticut Space Grant College Consortium
Florida Space Grant Consortium
NASA Kentucky Space Grant Consortium and EPSCoR Programs
Louisiana Space Consortium (LaSPACE)
Maryland Space Grant Consortium
NASA Nebraska Space Grant
New Mexico Space Grant Consortium
North Carolina Space Grant
Oregon NASA Space Grant Consortium
Texas Space Grant Consortium
Washington NASA Space Grant Consortium
SSEP on STS-135
Final Flight of Shuttle Atlantis
and of U.S. Space Shuttle Program

Launch: July 8, 2011

Payload: *Intrepid* (SSEP2), 11 SSEP experiments

NAU/ NASA Space Grant
Connecticut Space Grant College Consortium
Indiana Space Grant Consortium
Iowa Space Grant Consortium
Maryland Space Grant Consortium
Massachusetts Space Grant Consortium MIT
NASA Nebraska Space Grant (2 communities)
SSEP Mission 1 to ISS

Up-flight: SpaceX Dragon demo flight (COTS 2+)
Launch: May 22, 2012

Notable: first commercial vehicle to berth with ISS

Payload: Aquarius (SSEP3), 15 SSEP experiments

Partner SGCs:
District of Columbia Space Grant Consortium
Indiana Space Grant Consortium
Maryland Space Grant Consortium
Massachusetts Space Grant Consortium
NASA Nebraska Space Grant
Texas Space Grant Consortium
SSEP Mission 2 to ISS

Up-flight: SpaceX-1
Launch: October 7, 2012

Notable: first operational flight of the Dragon spacecraft

Payload: Antares (SSEP4), 11 SSEP experiments
Aquarius II (SSEP3b), 12 SSEP Mission re-flight experiments

California Space Grant Consortium
Connecticut Space Grant Consortium
Massachusetts Space Grant Consortium
New Jersey Space Grant Consortium
North Carolina Space Grant
Texas Space Grant Consortium
Virginia Space Grant Consortium
SSEP Mission 3 to ISS

Mission 3a:
Up-flight: Orbital Sciences Demonstration 1 (Orb-D1)
Launch: September 18, 2013
Notable: first Cygnus berthing with ISS
Payload: *Falcon I* (SSEP5a), 5 SSEP experiments; 1 M1 re-flight; 1 M2 re-flight

Mission 3b:
Up-flight: Orb-1; Launch: currently NET December 8, 2013
Notable: first operational flight of Cygnus spacecraft
Payload: *Falcon II* (SSEP5b), 12 SSEP experiments

District of Columbia Space Grant Consortium
Kansas Space Grant Consortium
Maryland Space Grant Consortium
Massachusetts Space Grant Consortium
Nebraska Space Grant Consortium
New York Space Grant Consortium
North Carolina Space Grant Consortium
Oregon Space Grant Consortium
Virginia Space Grant Consortium
SSEP Mission 4 to ISS

Up-flight: Orb-1
Launch: currently NET December 8, 2013

Notable: first operational flight of Cygnus spacecraft

Payload: Orion (SSEP6), 11 SSEP experiments

Indiana Space Grant Consortium
New York NASA Space Grant Consortium, Cornell University
NASA Pennsylvania Space Grant Consortium (2 communities)
SSEP Mission 5 to ISS

Expected Launch: Spring 2014

Launch Vehicle: to be determined

Payload: *Charlie Brown* (SSEP7), 15 SSEP experiments

California Space Grant Consortium
NASA Florida Space Grant Consortium
NASA Kentucky Space Grant and EPSCoR Program
Maryland Space Grant Consortium
Massachusetts Space Grant
Mississippi Space Grant Consortium
New York Space Grant Consortium
North Carolina Space Grant Consortium
SGC Partnership on SSEP

23 SGCS:

AZ, CA, CT, DC, FL, IA, IN, KS, KY, LA, MD, MA, MS, NC, NE, NJ, NM, NY,

OR, PA, TX, VA, WA

Mission 6 to ISS just announced: how you can help
And now .... Beer in Space
Voyage
A celebration of what we know about our place in space … and that we can know it.

On the Web: http://ncesse.org/voyage

Voyage on the National Mall Photo-album: http://voyagesolarsystem.org/facebook/dc
We’ll Miss You

Jupiter

Saturn

Mars

Venus

More

Mars
Voyage  A celebration of what we know about our place in space ... and that we can know it.

The Voyage Exhibition in Kansas City, MO

Opening Date: October 10-11, 2008

On the Web: http://ncesse.org/voyage

Houston Photo-album: http://voyagesolarsystem.org/facebook/kc
Voyage  A celebration of what we know about our place in space ... and that we can know it.

The Voyage Exhibition at Space Center Houston

Opening Date: November 14, 2008

On the Web: http://ncesse.org/voyage

Houston Photo-album:
http://voyagesolarsystem.org/facebook/houston
A celebration of what we know about our place in space ... and that we can know it.

The Voyage Exhibition in Corpus Christi, Texas
Opening Date: July 18-20, 2009

On the Web: http://ncesse.org/voyage

Corpus Christi Photo-album: http://voyagesolarsystem.org/facebook/cc
June 2013 Major Update – Voyage on the National Mall
**Voyage to Mars**

It seems almost Earth-like here, like a desolate spot in a desert. But the air is far thinner than atop Earth's highest mountains and mostly carbon dioxide. In summer, near the Martian equator, the temperature typically reaches 60°F (17°C). But at night it falls to a chilling -130°F (-90°C).

**Earth Invades Mars!**

Near the northern wall of Gale Crater, NASA's Curiosity rover readies to drill into rock for the first time on another planet (see image at left). In the distance is 3.4 mile (5.5 km) high Mount Sharp, Curiosity's destination at the crater's center. Many more robotic spacecraft will journey to Mars. One day, will humans follow?

**Life on Mars?**

Long ago Mars was warm and wet, but its channels, tributaries, and flood plains are now dry. On Earth, water is a key ingredient for life, so perhaps life once existed on Mars as well. Deep in the Martian soil, shielded from the Sun's harmful rays, life may still exist.

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**Voyage**

Voyage is an exhibition of the National Center for Earth and Space Science Education and the Smithsonian Institution. It is designed for permanent installation in communities worldwide. http://vogm.org/system.org
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**Walk to Asteroids and Comets**

About 28 steps

**Imagine**

Exploring the surface of Mars is comparable to exploring all the continents of Earth.

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**Distance to Sun:**

2.28 x 10^7 km

**Diameter:**

1/2 x Earth

6,794 km

**Mass:**

1.9 x Earth

6.42 x 10^23 kg

**Rotation Period:**

24.6 Hours

**Time to Orbit Sun:**

1.9 Earth Years

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**Walk the Scale Model Solar System**

Washington Monument

Entry

Neptune

Ereptor

Uranus

Saturn

Jupiter

Venus

Sun

Mercury

Earth

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Image is an exhibit of the National Center for Earth and Space Science Education and the Smithsonian Institution. It is designed for permanent installation in communities worldwide. http://voyager overshoot.org
Voyage to the Sun

The Sun’s surface is a turbulent sea of hot gas. Blinding light pours up from below, created a million years earlier at the core of this vast ball of mostly hydrogen and helium. The surface temperature can approach 11,000°F (6,100°C), hot enough to vaporize anything.

From the Solar Tempest

At any moment, from a solar storm large enough to swallow a hundred Earths, a cataclysmic eruption—a Coronal Mass Ejection—can explode into space at speeds up to 900 miles per second (1,500 km/sec). It can reach Earth in days and ignite an eerie light show in the far northern and southern skies: the auroras.

The Power Source of the Solar System

You are reading this in light that left the Sun 8 minutes ago. Light from the Sun bathes the solar system, reaching distant Neptune in 4 hours. When sunlight reaches the planets, it powers weather systems and creates climates. The Sun’s energy also makes something else possible—life on Earth.
There is now a Space Grant presence on the National Mall
You are standing near the Sun within a model of our solar system. The real solar system is 10 billion times larger.

Take a voyage! Imagine exploring our solar system as a giant. As you travel, you encounter the Sun and its planets, each small enough to hold in your hand. To your left you can see the Sun and inner planets: Mercury, Venus, Earth, and Mars. Neptune is the farthest planet. The dwarf planet Pluto is farther still. Look at the map below to see where you are.

Would you like to visit Proxima Centauri, the nearest star to the Sun? At this scale it would be the size of a grape on the coast of California, 2.500 miles (4,000 km) from where you are standing.

Our Star the Sun
Imagine the view from space. Countless points of brilliant light shine against an ink-black sky. Because it is so close, one star seems blinding and immense—our Sun.

Planets and Empty Space
The Sun’s family of planets is spread across a vast and mostly empty space. This scale model of our solar system provides a feel for just how vast and empty it is. The planets of the inner solar system—Mercury, Venus, Earth, and Mars—are clustered close to the Sun. The outer planets—Jupiter, Saturn, Uranus, and Neptune—are spread much farther apart.

The Sun’s Family
Think of our solar system as the Sun’s family. Along with Earth and the other 7 planets, it includes over 175 moons, countless chunks of rock and ice called asteroids and comets, and over 1,200 icy bodies beyond Neptune—Pluto being one of the largest. The whole system is constantly moving: moons orbit their planets; planets and everything else orbit the Sun. What holds the family together? Gravity.
Voyage Mark 2 – Target: 100 Planet-wide
Partnership – It’s How You Move Mountains