Vermont Space Grant Consortium

A Consortium Highlights Presentation for the 2016

Northeast Regional Space Grant Meeting

NIFS Overview

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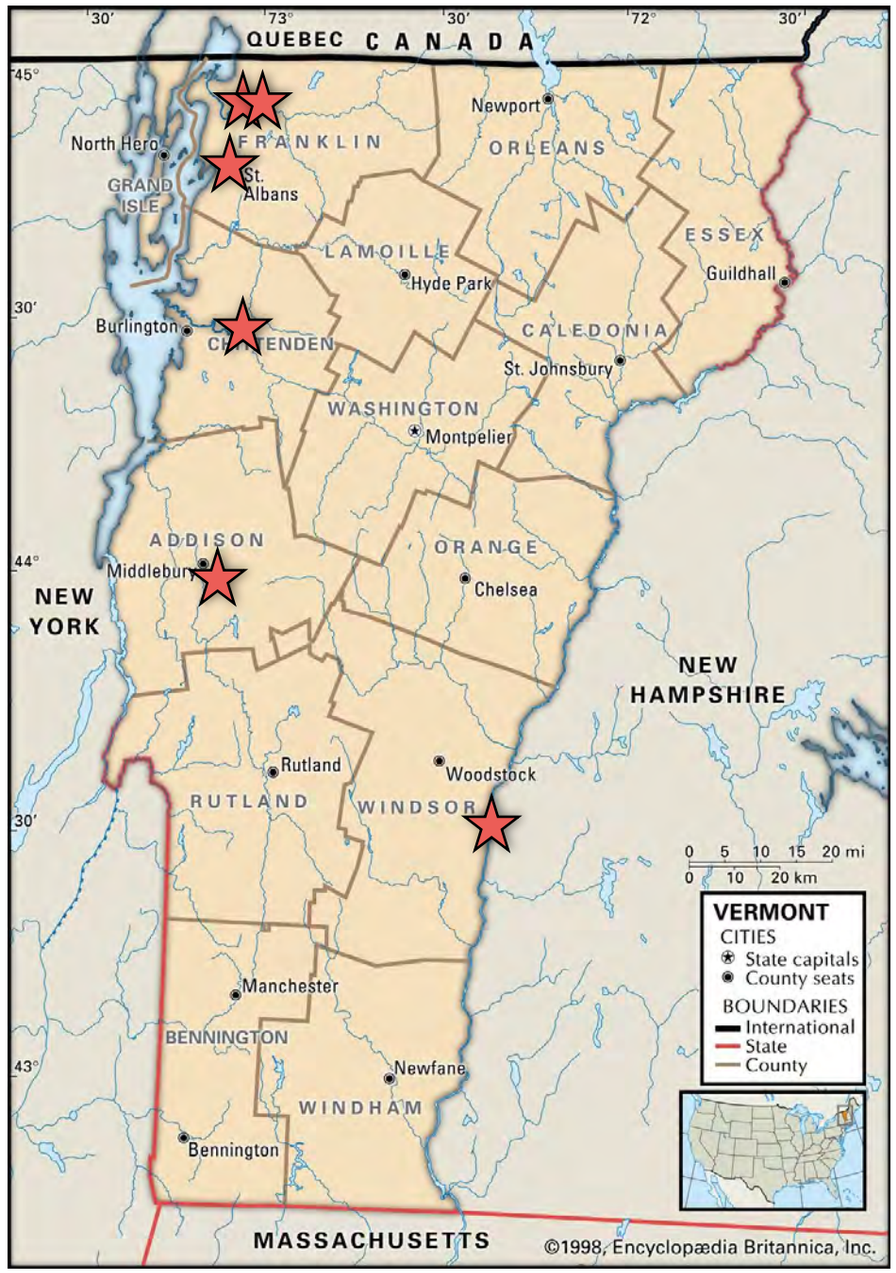
- VTSGC STEM Scholarships
  - Six scholarships of $5,000
  - 83% female awardees
  - 33% Native American awardees

- Workforce Development Scholarships (BTC)
  - Three scholarships of $2,500

- NASA Summer Workshops
  - RockOn! at NASA Wallops
  - CT/NC SGC Aircraft Readiness Workshop
  - International Space Camp for Educators



NIFS Overview (cont'd)

- NASA Summer Internships
  - NASA Goddard Space Flight Center, topic: satellite trajectory optimization
  - NASA Langley Research Center, topic: computational fluid dynamics grid meshing for high speed flows
  - NASA Goddard Space Flight Center, topic: advanced thermal control devices for spacecraft applications

- NASA MARTI Aeronautics Program Internship
  - NASA Armstrong Flight Research Center

- AY15-16 Graduate Fellowships
  - Eight full-time graduate fellowships awarded
  - Four part-time fellowships awarded

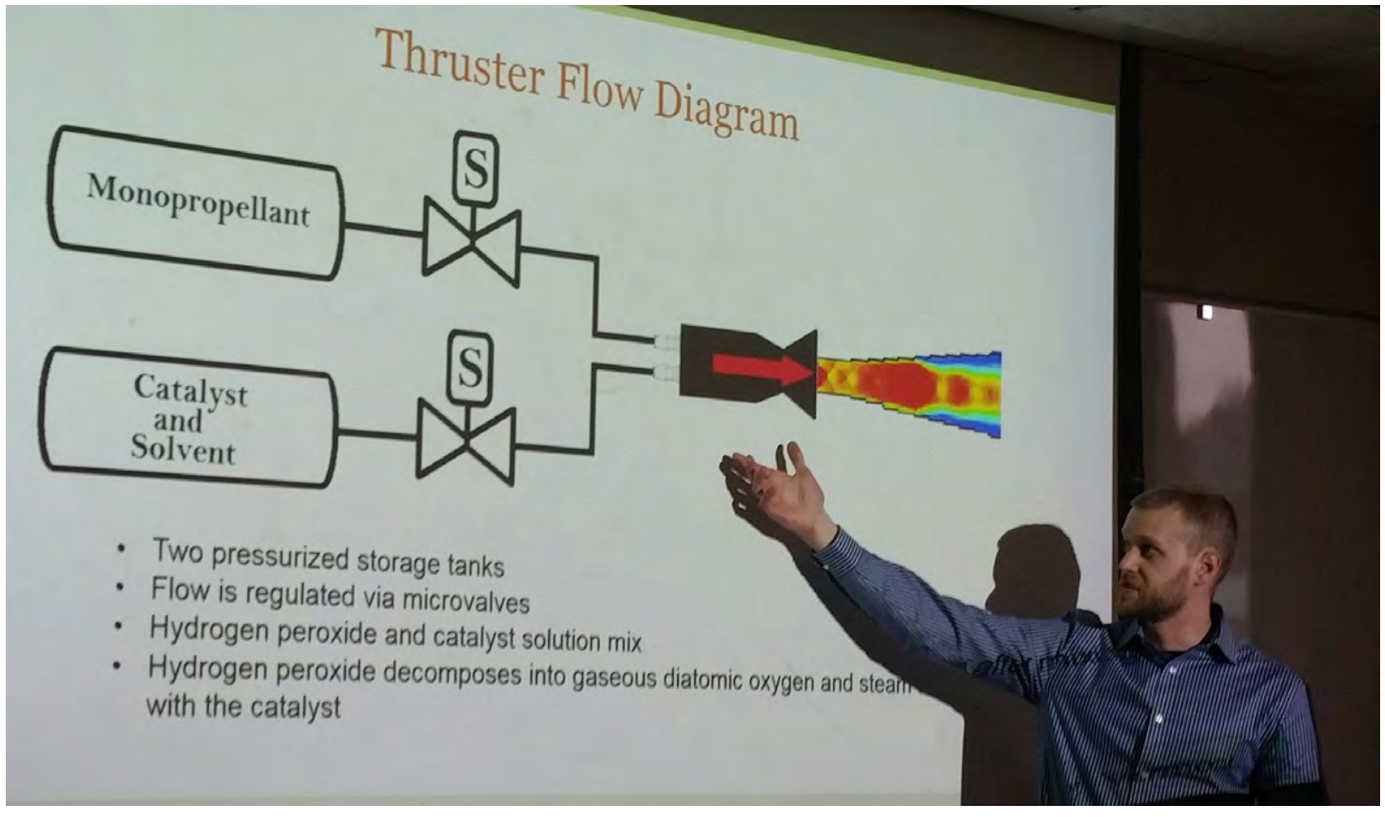
NIFS Overview (cont'd)

- AY15-16 Graduate Fellowships (cont'd)
  - Areas supported:
    - Computer Science
    - Electrical Engineering
    - Molecular Physiology & Biophysics
    - Mechanical Engineering
    - Mathematics
    - College of Medicine
  - Four awards to females; One minority; One w/ disability
  - New graduate program in Computer Engineering at Vermont Tech; 1 MS student supported in AY16-17

Success Story: Kevin Gagne

- Kevin Gagne, Mechanical Engineering, MS awarded

  “H_2O_2 Monopropellant Reaction Control System for Small Satellites”



New Development: UVM Med-X

- Grass roots movement in UVM College of Medicine for medical students interested in space medicine
- VTSGC supported collaborative visit to NASA JSC for purposes of future internships and research opportunities

Technical School Augmentation Award

“Enhancement of the Aviation Technology Program at Burlington Technical Center”

(2-Yr Proposal for $440,662)

BTC visit to Wind Tunnel Lab (11-Nov-2015)

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(2-Yr Proposal for $440,662)

Tentative agreement established leading to BTC graduates receiving an AA degree from Vermont Tech

BTC ⟷ VERMONT TECH

coordinated by Prof. R. Letovsky, Saint Michael’s College

Undergraduate Research Activities

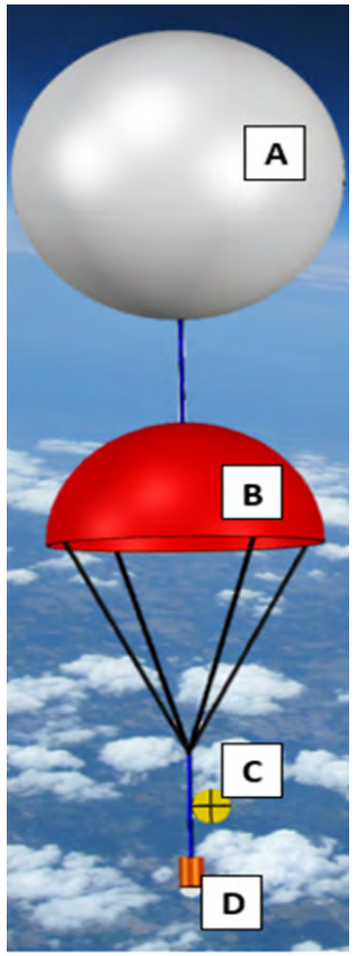
High Altitude Research Balloon

Norwich University

Students: Austin Blum, Adam Dymit, Matthew Grohs, Timothy Smeddal, Brett Valcourt

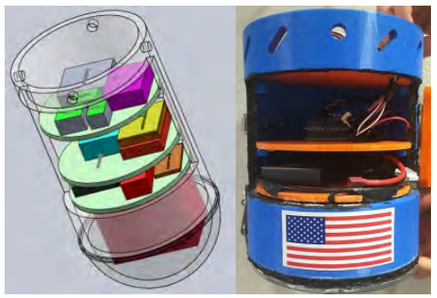
Advisors: Danner Friend and Jacques Beneat

The objective of this project was to design, build, and launch a balloon-lifted payload that can take pictures and video and collect data on concentrations of methane and ozone in the atmosphere at all altitudes between the surface and target altitude of 100,000 ft. Innovative features included a 3D-printed chassis and a high-resolution camera mounted on a vibration dampening gimbal mount.



[A] 3000 gram balloon
[B] parachute
[C] radar reflector
[D] payload

Launched from Broadalbin-Perth High School west of Saratoga, NY



Payload Assembly

Google-Earth® image showing the CUSF 2.5 predicted flight path (yellow line) and GPS data from actual flight (yellow pins)

Landed and recovered near Manchester, VT

Image taken close to maximum altitude of 103,484 ft.

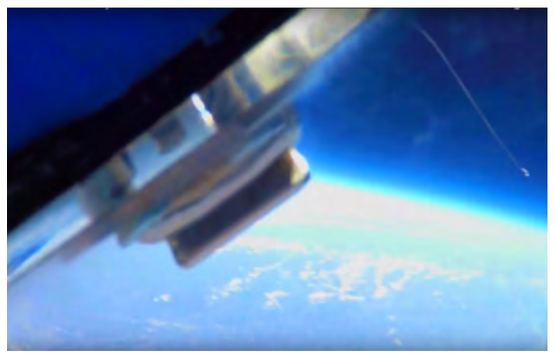


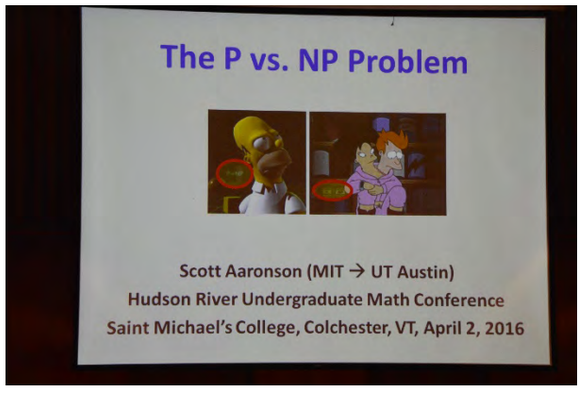
Image taken shortly after balloon burst showing the curvature of the Earth.

Project Accomplishments and Accolades

- Successful launch and recovery of payload.
- Reached an altitude of 103,484 ft recording video and data collection of methane and ozone.
- 1st place in team project category at AIAA Northeast Region Student Conference.
- 1st place for senior projects presented at Norwich Engineering Convocation.
- Glenn L Harvey Mechanical Engineering Design Award at Norwich University.
- Presented at Vermont Society of Engineers Annual Meeting.

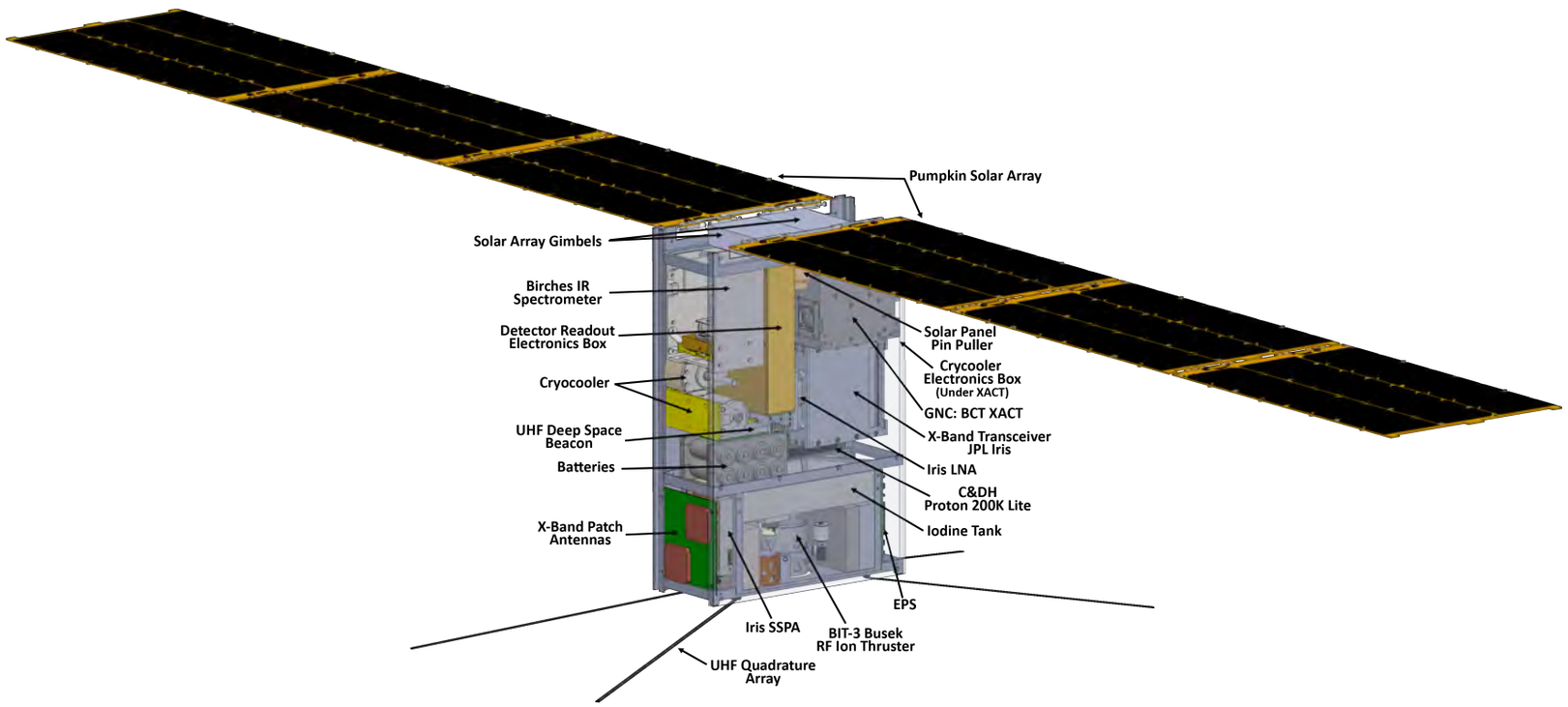
XXIII Hudson River Undergraduate Mathematics Conference at Saint Michael's College: April 2, 2016

- Held in Vermont for the first time ever
- About 300 participants from 34 colleges throughout New England
- 120 talks given by students and faculty
- Plenary Speaker: Scott Aronson (MIT/UTexas)
- *Funded in part by NASA-VTSGC*



Vermont Tech - NASA Lunar IceCube Mission

- Faculty and undergraduates are developing flight software for the NASA Lunar IceCube Mission



Undergraduate Design Activities

NASA
UVM
UVM
UVM
UVM
UVM
UVM

MUSEUM OF SCIENCE FICTION
WASHINGTON DC

Washington, DC
USA, Earth / Sol, Milky Way

CubeSat Competition

The Museum of Science Fiction's CubeSat Competition encourages innovative thinking within the commercial space technology sector and is open to all high school students.

The purpose of the competition will be to:

Reward innovations that are possible by leveraging off-the-shelf technologies, small teams, and other agile approaches to creating next-generation spacecraft and motivate the next generation of explorers to reach for new heights and reveal the unknown, on their own terms.

Broaden public participation in space exploration as part of a larger goal to commoditize space technology and bring a consumer model to the business of space, which promises to accelerate the pace of space science and human settlement of the solar system.

Break the paradigm of large-scale, expensive, government-driven science and exploration by offering successful alternatives in the form of a small-scale, revolutionary flight demonstration.

Infuse creativity and innovation into STEAM education at the high school level.

Registration and Submission period is October 19, 2015 — **April 18**, 2016

Judging and proposal evaluations will begin on **April 19**, 2016.

Award notification will be made on **May 9**, 2016. Award recognition will be made at Escape Velocity 2016 on Saturday, July 2, 2016.

Student teams from the United States or abroad can participate.

Learn more at:
museumofsciencefiction.org/cubesat

museumofsciencefiction.org

2015 MOSF is a nonprofit 501 C3 organization

Artwork by Mike Winkelmann (aka Beeple)

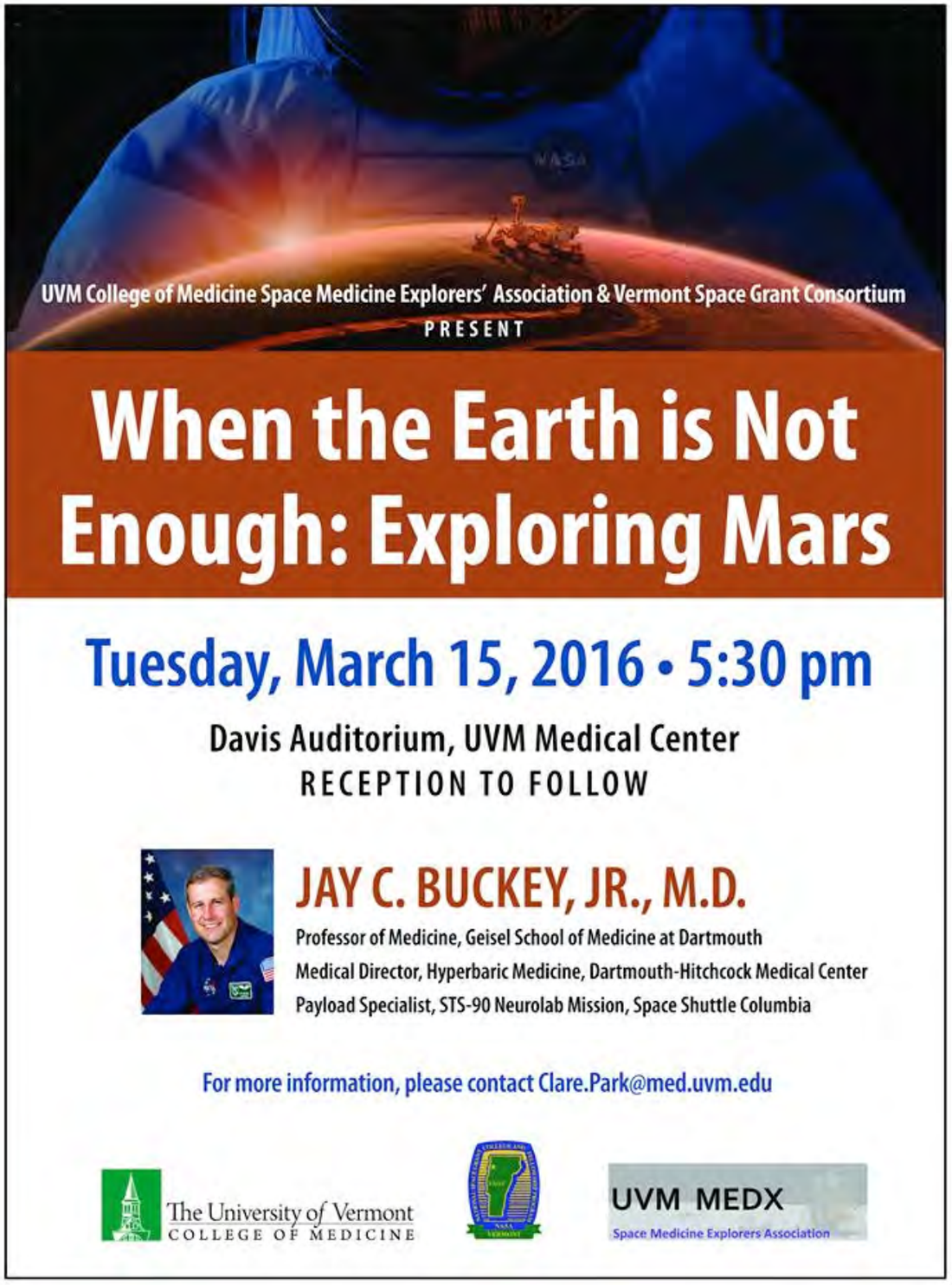
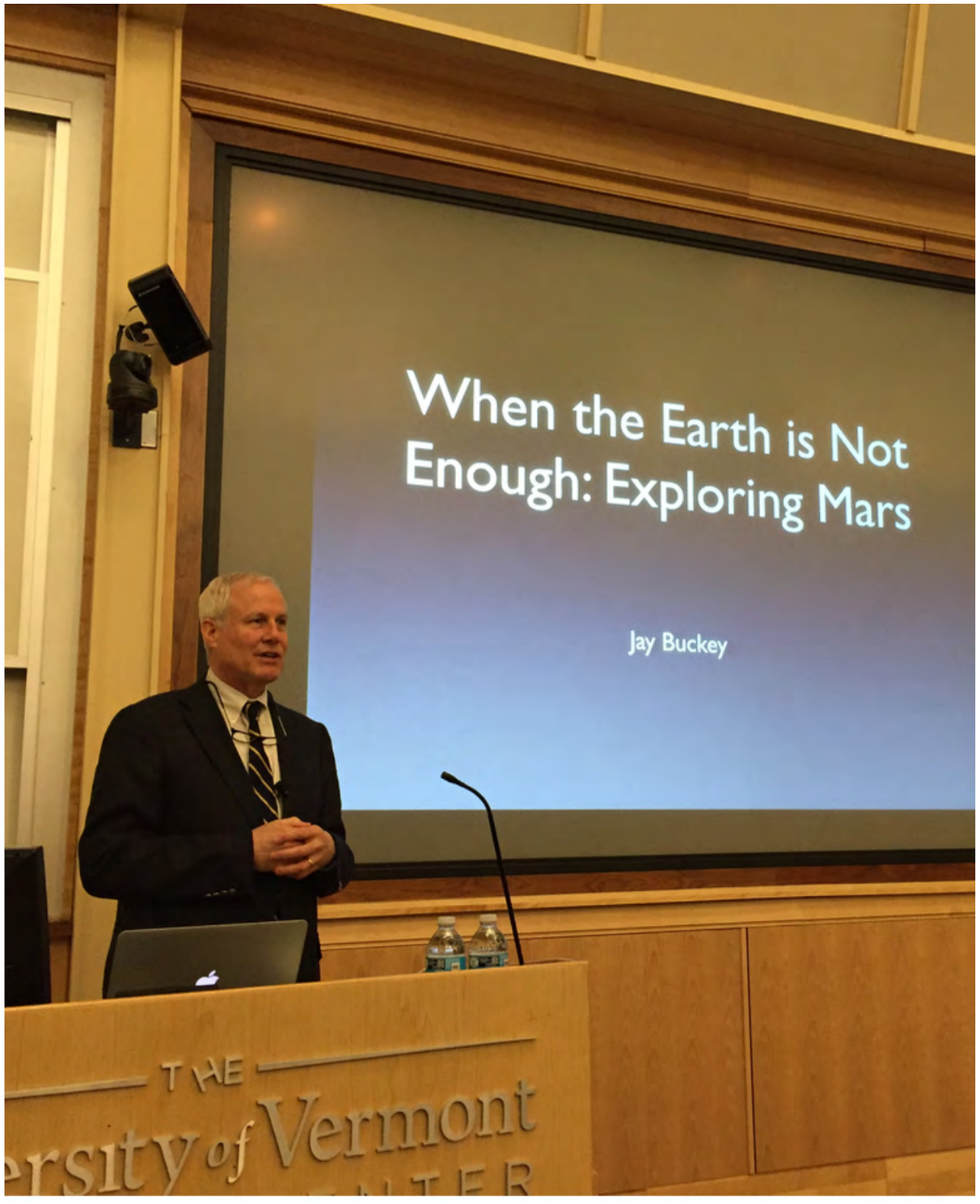
K-12 & Outreach Programs

Governor's Institutes of Vermont Partnership

- New 2016 Astronomy Summer Institute at Lyndon State College; in collaboration with Fairbanks Museum and Northern Skies Observatory
- New Aerospace Engineering Track offered at UVM in Summer 2016

Students will explore the following:

- Learn the constellations, how things move in the night sky, & the motions of the planets
- Telescopes, optics, and how to use them
- Visual observing as well as digital methods (both for fun and amateur research)
- Advanced CCD camera systems
- Remote and robotic telescope operation
- Solar science safe solar observing and photography (white light and Hydrogen alpha)
- Deep sky astrophotography, narrow band research imaging, and video imaging techniques
- Photometry (precise measurement of brightness of stars, asteroid periods, & supernovae in specific wavelength
- Spectroscopy (analysis of the "fingerprints" of elements in stars & planets)
- Astrometry (accurate measurement of position — useful for orbits of moving objects)
- Projects that can be continued after GIV for possible school credit (or publication!)

GIV Astronomy Institute (cont'd)

Guest Seminar: Dr. Jay Buckey (Dartmouth School of Medicine)