

# HABs at UND:

**Lunar Mars Analog  
HABitat**



**High Altitude  
Ballooning (HAB)**



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**Grand Forks, ND**

# Lunar / Mars Analog Habitat



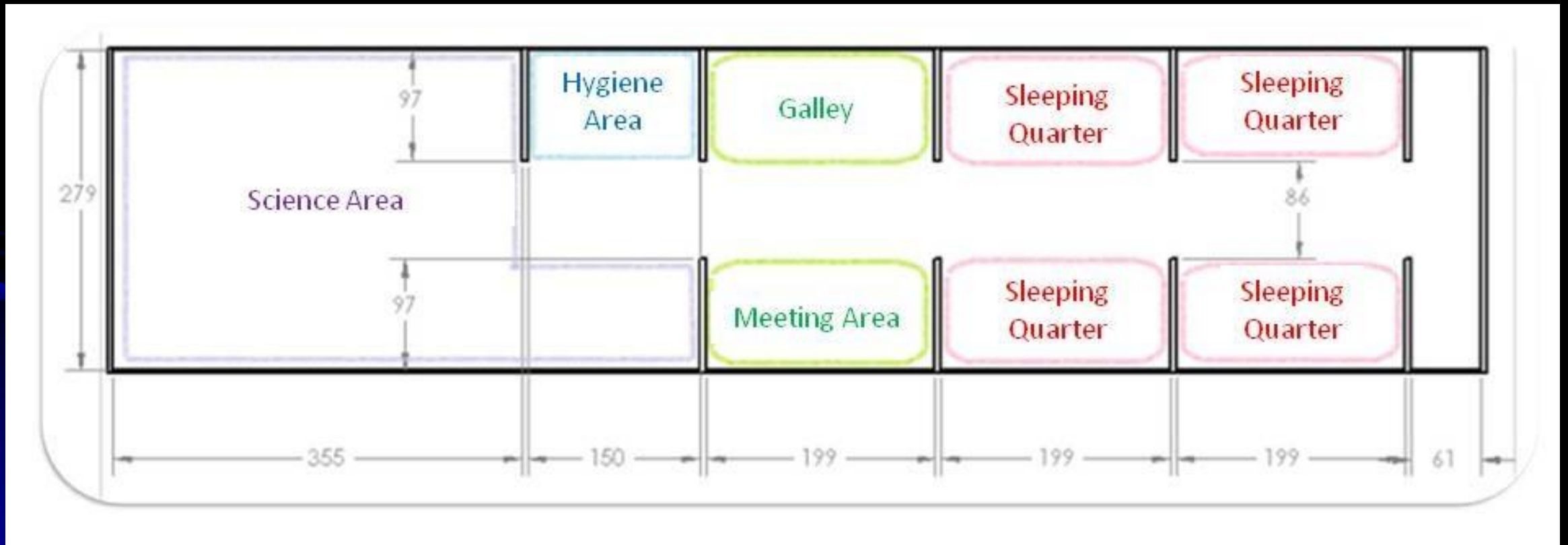
# Lunar / Mars Analog Habitat

- Inflatable Habitat Module
- Electric Rover
- 2 NDX-2 Planetary Spacesuits



# Lunar / Mars Analog Habitat

## The Habitat Module:



# Lunar / Mars Analog Habitat

## The Habitat Module:



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## The Habitat Module:



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## The Rover:



# Lunar / Mars Analog Habitat

## The Spacesuits:





# Lunar / Mars Analog Habitat

## The Mission:

- 10 days
  - Oct 27 - Nov 6, 2013
- 3 person crew
- Mission Goals:
  - Test the system and generate adjustments for future missions
  - Simulate a Lunar/Martian environments & activities for 10 continuous days



# Lunar / Mars Analog Habitat

## The Crew:

- Travis Nelson
- Erika Dolinar
- Tim Buli



# Lunar / Mars Analog Habitat

## Extra Vehicular Activity (EVA):



# Lunar / Mars Analog Habitat

## Data Collection:

- **3x Daily Health Survey**
  - Blood pressure, heart rate & respiration rate
- **Daily journal entries**
  - Log of activities, general mood & notes about habitability
- **Indoor and Outdoor temperature levels**
- **Food and Water consumption**



# Lunar / Mars Analog Habitat

## Media Coverage:

- Radio and TV news programs in 30 states nationwide including FOX, ABC, CBS and NPR.
- Daily updates featured on WDAZ news
- 6 local newspaper articles
- Over 200,000 blog views
  - [spacesuitlab.blogspot.com](http://spacesuitlab.blogspot.com)
- Interviewed STS-122 Astronaut Stan Love

ND DAKOTA NEWSSTAND PRICE, \$1.50 Year 134, Issue 121 (c) 2013  
City and state B1 Classified C4-6 Comics D4 Editorial A4 Fun Page/Movie Listings A6 Lottery A3 Nation/World B4 Obituaries B2 Sports D1 Weather A3



Eric Hylden, staff photographer

▲ UND Space Studies graduate student Travis Nelson tests out the NDX-2AT space suit in the parking lot near Clifford Hall this past weekend.

## Moon Base UND

■ Three student volunteers start experiment in lunar living this week

**By Tu-Uyen Tran**  
Herald Staff Writer

Inside the confines of the moon rover, mission commander Travis Nelson grabbed a metal bar overhead, pulled himself up and stuck his foot into a hole that lead to the inside of a spacesuit.

The back of the suit is attached to the outside of the rover, but the boot isn't attached to anything. Nelson's left foot got snagged inside somewhere above the ankle, and no amount of pushing or twisting would get it in, especially because when he twisted his foot the boot turned as well.

Outside, in the parking lot by UND's Clifford Hall, two fellow graduate students came to his aid, holding the boot for him.

The awkward moment finally over, Nelson looked up, grinned and gave a mock salute.

"They're not used to this yet," said Tiffany Swarner, one of the students who helped him. "They just need practice."

There will be plenty of that this week as Nelson and two other graduate students embark on a simulated moon mission on the west end of campus. They'll live for 10 days in a moon base, drive around in a moon rover and explore in space suits, all the while reporting on their mental and physical conditions.

The goal is to find out what it would be like if people lived on the moon, what problems they might encounter, what solutions might work, Nelson said.

Along the way, he and the other simulated astronauts hope to answer questions such as: How much food and water would an astronaut require if he or she had to spend half the day in a bulky, heavy spacesuit? How would people react to living in a windowless home with practically no privacy? How easy is it to back a moon rover into position to hookup with the

**MOON:** See Page A2

**Campus moon base**  
UND is developing a concept for colonizing the moon.

Here's what's being tested:  
**Housing:** A 40-foot long, 10-foot wide and 8-foot high inflatable building with a metal frame will house up to four astronauts for six months at a time. Inside, there are four bedrooms—actually they're more like closets—a kitchen, a bathroom and a laboratory. At one end is a long tube that hooks up with the rover. The frame was designed with help from Icon Architects in Grand Forks.

**CAMPUS:** See Page A2

# Lunar / Mars Analog Habitat

## Media Coverage:

- **Post-mission press conference**



# Lunar / Mars Analog Habitat

## Future:

- Mission II – 30 days
  - October 2014
- Development of additional interconnecting modules



# High Altitude Ballooning (HAB)





# What is a High Altitude Balloon?

- Sometimes called a weather balloon
- Filled with Hydrogen or Helium
- Carry scientific payloads high into the stratosphere





# High Altitude Ballooning Projects at UND-2014

- Near Space Balloon Competition
- Grand Forks Middle Schools
- Academic High Altitude Conference



# Near Space Balloon Competition (NSBC)

- Payload design competition for North Dakota students grades 6-12
- 2014 (3<sup>rd</sup> year):
  - April 26 Launch
    - Postponed until May 10 due to weather
  - Launch Site: Northwood High School



# Near Space Balloon Competition (NSBC)

- 2014 participating Schools:

- Century High School  
(Bismarck)

- West Fargo High School  
(West Fargo)

- Northwood High School  
(Northwood)

- Elroy Schroeder Middle  
School (Grand Forks)

- Shanley High School  
(Fargo)

- South Middle School  
(Grand Forks)



# Grand Forks Middle Schools

- Valley Middle School
  - November 13, 2013
- South Middle School
  - May 14, 2014
- Elroy Schroeder Middle School
  - May 16, 2014



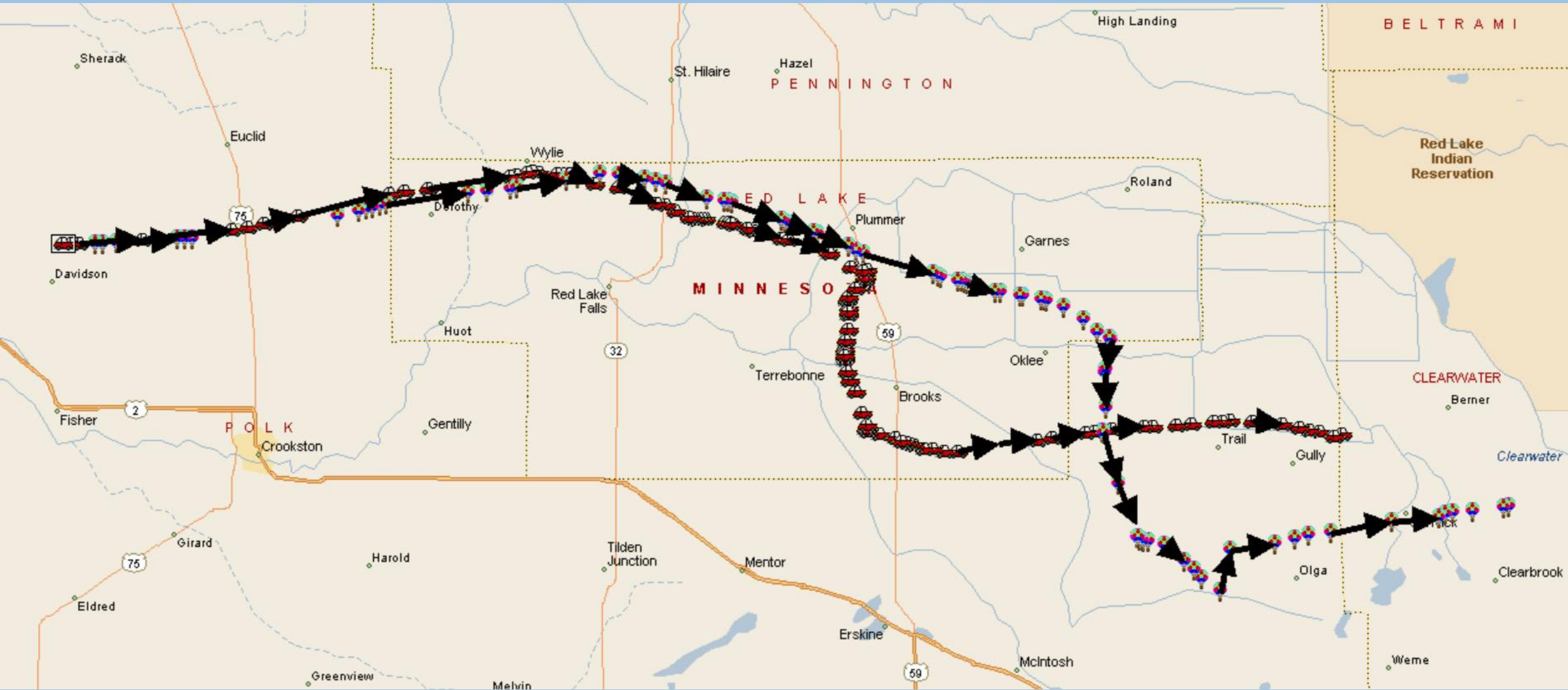
# Grand Forks Middle Schools

- Valley Middle School
  - Marissa Saad's Thesis (UND Space Studies)
  - Teacher: Brent Newman
  - 124 8<sup>th</sup> graders
  - 2 balloons
    - Balloon 1 max altitude: 102,500 feet
    - Balloon 2 max altitude: 102,050 feet











# Grand Forks Middle Schools

- South Middle School
  - Teachers: Jeff Lovin, Christine Slavens
  - 187 8<sup>th</sup> graders - 18 teams
    - 3 teams chosen for NSBC
  - Upcoming Launch Date: May 14, 2014
    - 2 balloons



# Grand Forks Middle Schools

- Elroy Schroeder Middle School
  - Teachers: Amy Bushaw, Kristi Otto
  - 160 8<sup>th</sup> graders - 16 teams
    - 3 teams chosen for NSBC
  - Upcoming Launch Date: May 16, 2014
    - 2 balloons

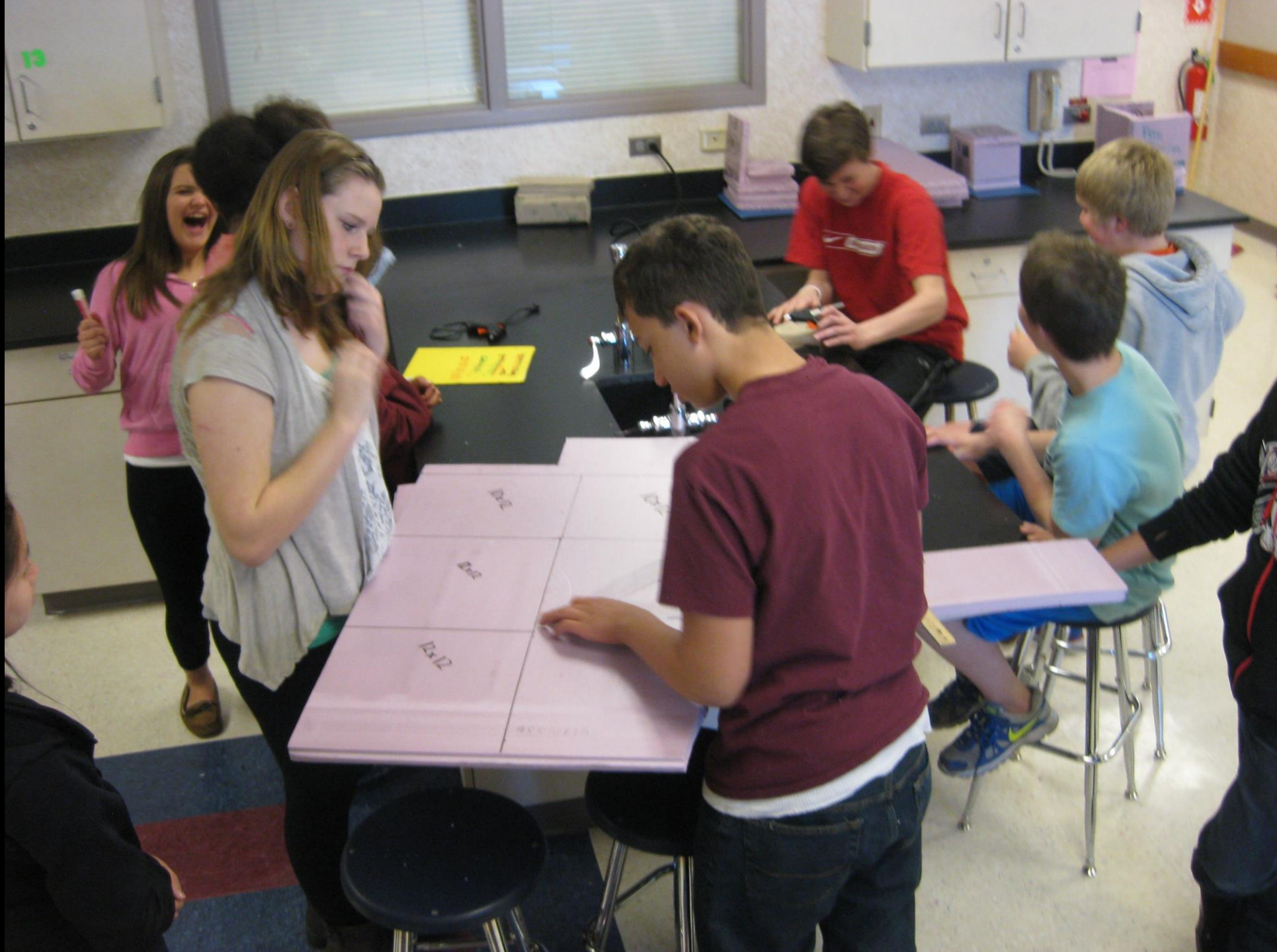


# The Mission

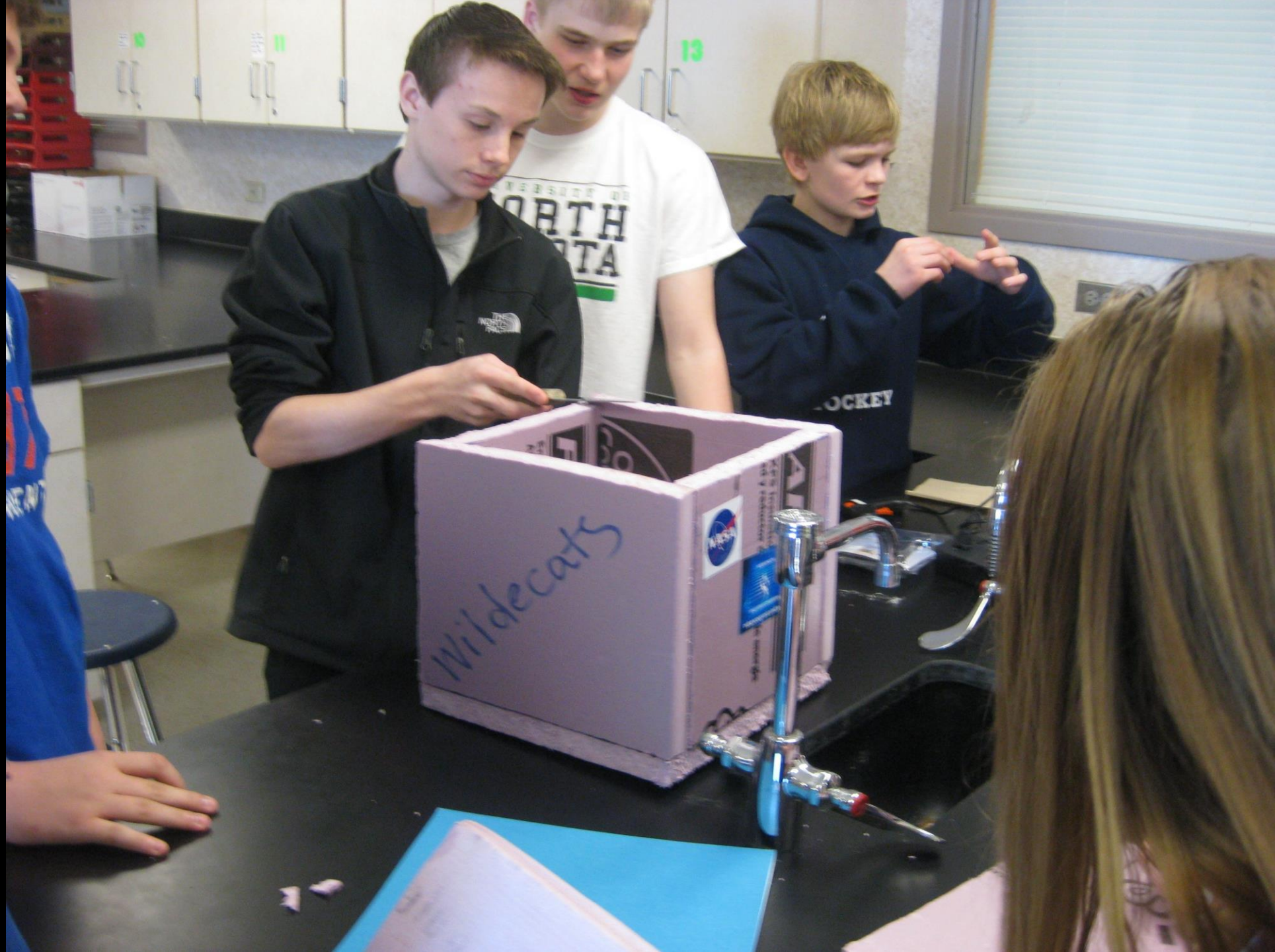
You are the Research and Development team for a High Altitude Balloon launch to take place in May 2014

1. Design an experiment to fly with the balloon
2. Submit a proposal
3. Build a payload to carry your experiment
4. Analyze the experimental results after the launch

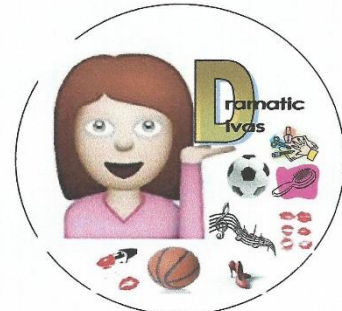
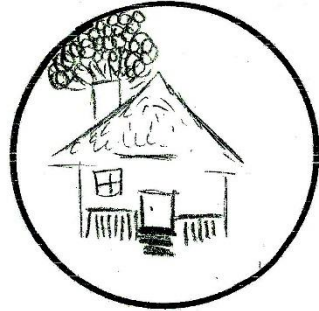
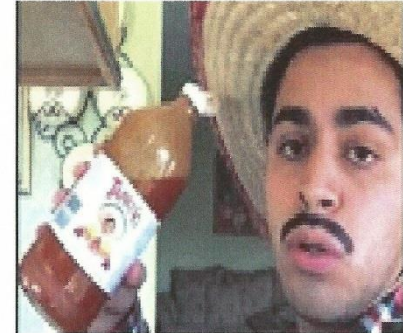
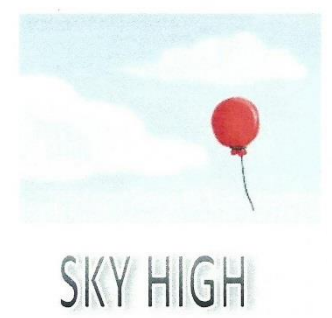
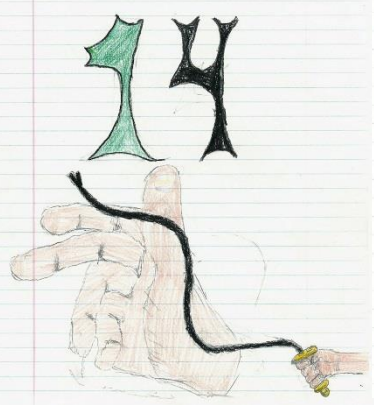












# Academic High Altitude Conference

- Stratospheric Ballooning Association
- June 23-27, 2014
  - Workshop for Educators: June 23
    - Caitlin Nolby, Marissa Saad
  - Balloon Launch: June 25
- [www.stratoballooning.org/conference](http://www.stratoballooning.org/conference)





Thank You