

# Mission to Mars and NASA Educator Resources

Marissa Saad

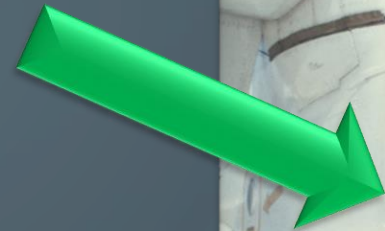
North Dakota Space Grant Consortium

$$E=mc^2$$



# Meet the Space Grant Team!

- Director of Space Grant, Jim Casler
- Deputy Director, Caitlin Nolby
- Coordinator, Marissa Saad



# WORKSHOP GOALS

## You will be able to:

- Confidently conduct today's activities in the classroom.
- Better understand concepts regarding space sciences.
- Effectively communicate in teams to successfully complete a mission to Mars.
- Save Mark Watney!
- Create a neutrally buoyant object to be used by astronauts in the NBL.
- Understand how YOU can get involved with NASA in ND!





# POCKET SOLAR SYSTEM



The background is a dark blue gradient with faint, concentric circles. In the corners, there are white, stylized circuit board traces and nodes. The top-left and bottom-left corners have more complex, branching patterns, while the top-right and bottom-right corners have simpler, more linear traces.

ROCKETS TO THE RESCUE!























# ROCKETS TO THE RESCUE

- Goal: Build and launch a rocket, keep your payload intact, and save Mark Watney!
- Launch your payload to Mars!
- What will be your team's strategy?



4-H  
NATIONAL  
YOUTH  
SCIENCE DAY



4-H NATIONAL YOUTH SCIENCE DAY

**ROCKETS**  
TO  
THE **RESCUE**

# ROCKETS TO THE RESCUE - BUDGET

*Maximum Budget: \$50,000,000*

Item Description	Cost Per Unit	Total Units	Total Item Cost
1 mini rubber band	\$40,000		
6 inches of duct tape	\$3,000,000		
6 inches of masking tape	\$2,000,000		
1 regular/large rubber band	\$80,000		
1 Pipe Cleaner	\$500,000		
1 Cotton Ball	\$5,000,000		
1 Straw	\$500,000		
1 Puff Ball	\$4,000,000		
12 inches of string	\$600,000		
1 full sheet of Tissue Paper	\$6,000,000		





# ROCKETS TO THE RESCUE

## CRITICAL THINKING QUESTIONS

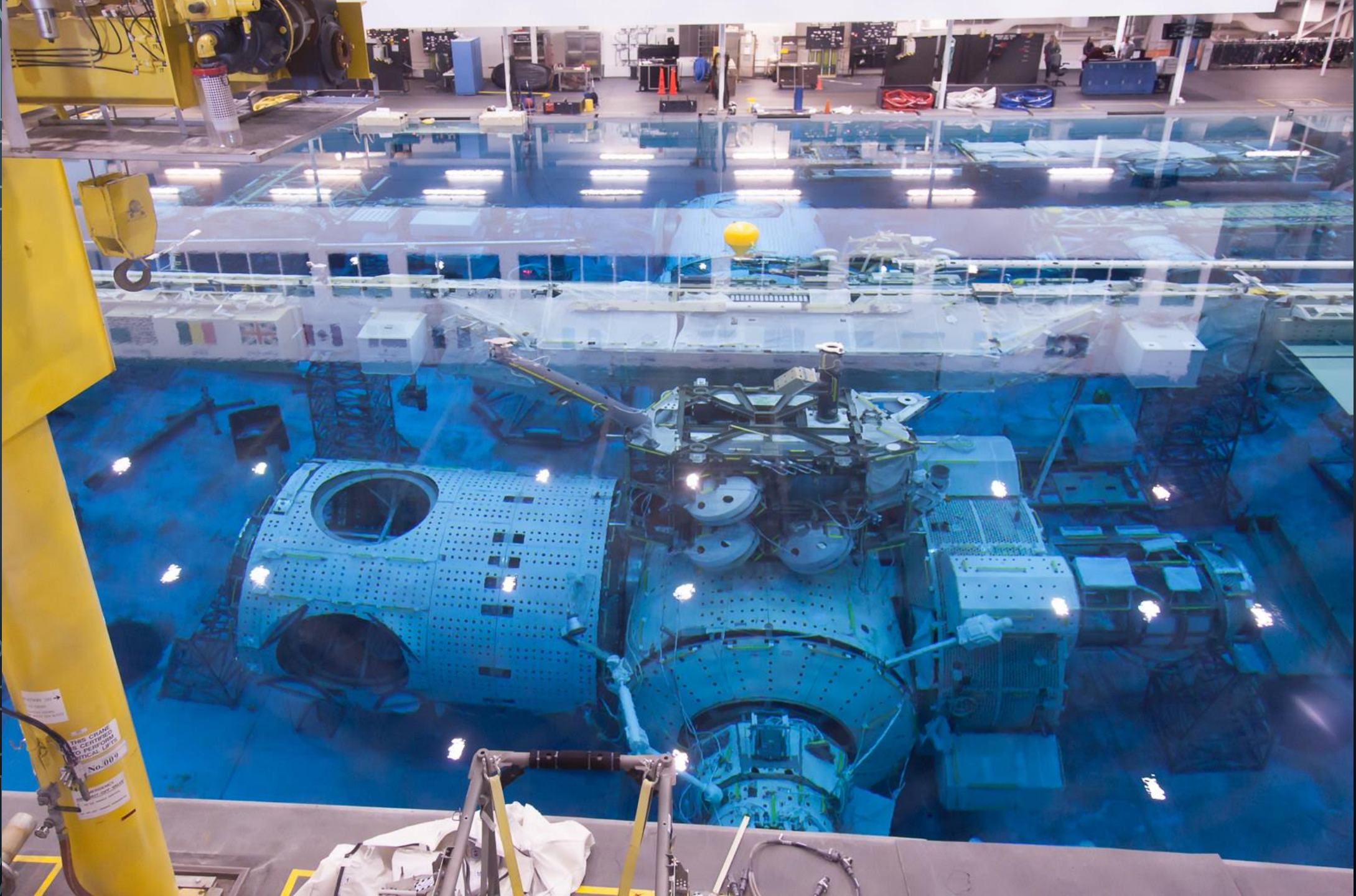
1. Was your rocket successful?
2. Take a look at other teams' designs. What materials did they use? Did their results differ from yours? Describe the outcomes.
3. How did gravity affect your design?
4. What should scientists consider when selecting materials? (think of sizes, weight, composition of the atmosphere, etc.)
5. Extra consideration: Integrate this activity into the classroom – add budgets, weight restrictions, competition between NASA centers, etc.
6. What shapes were the most aerodynamic? Are these necessarily the best designs?

# DEEP SEA DIVER



Eryn Beisner, a UND alumna







# SCIGIRLS DEEP SEA DIVER

Season 2, episode 1: *Aquabots*

**Challenge:** NASA is currently preparing for long-duration spaceflight to Mars and needs to practice procedures in the NBL. They need to select a contractor to design and build neutrally buoyant tools for training.

Make predictions on given materials

Design your “deep sea diver”

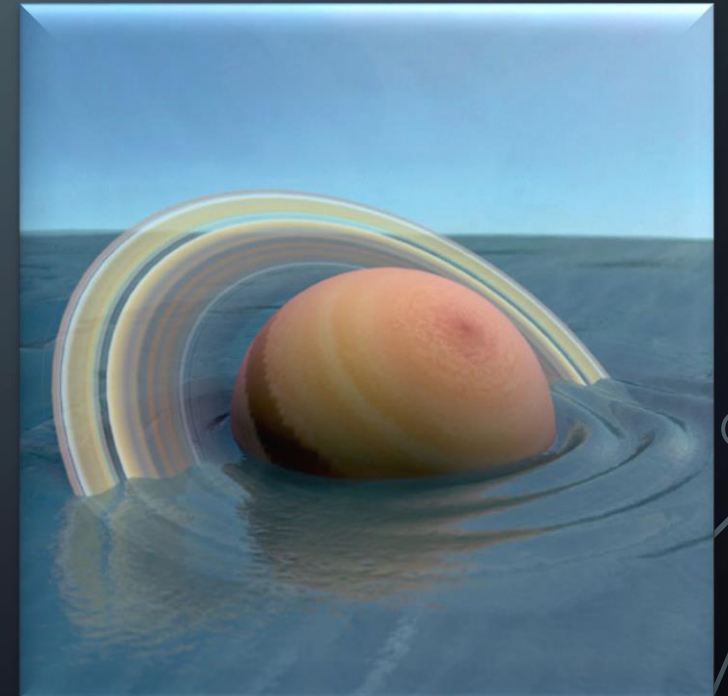
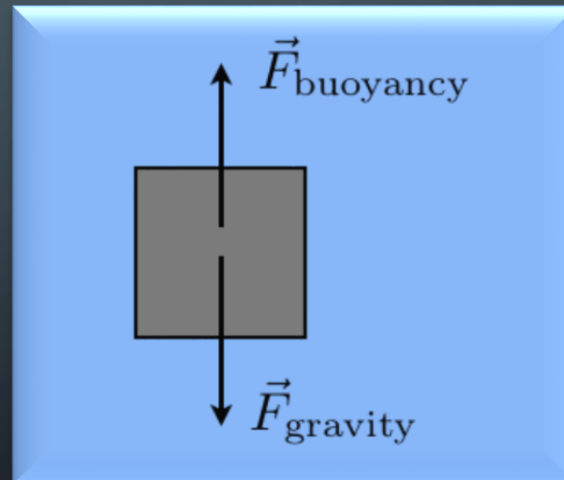
Collaborative Design Review





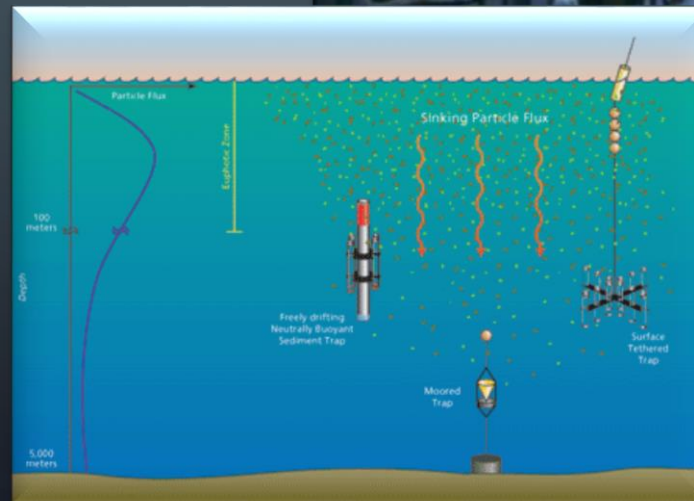
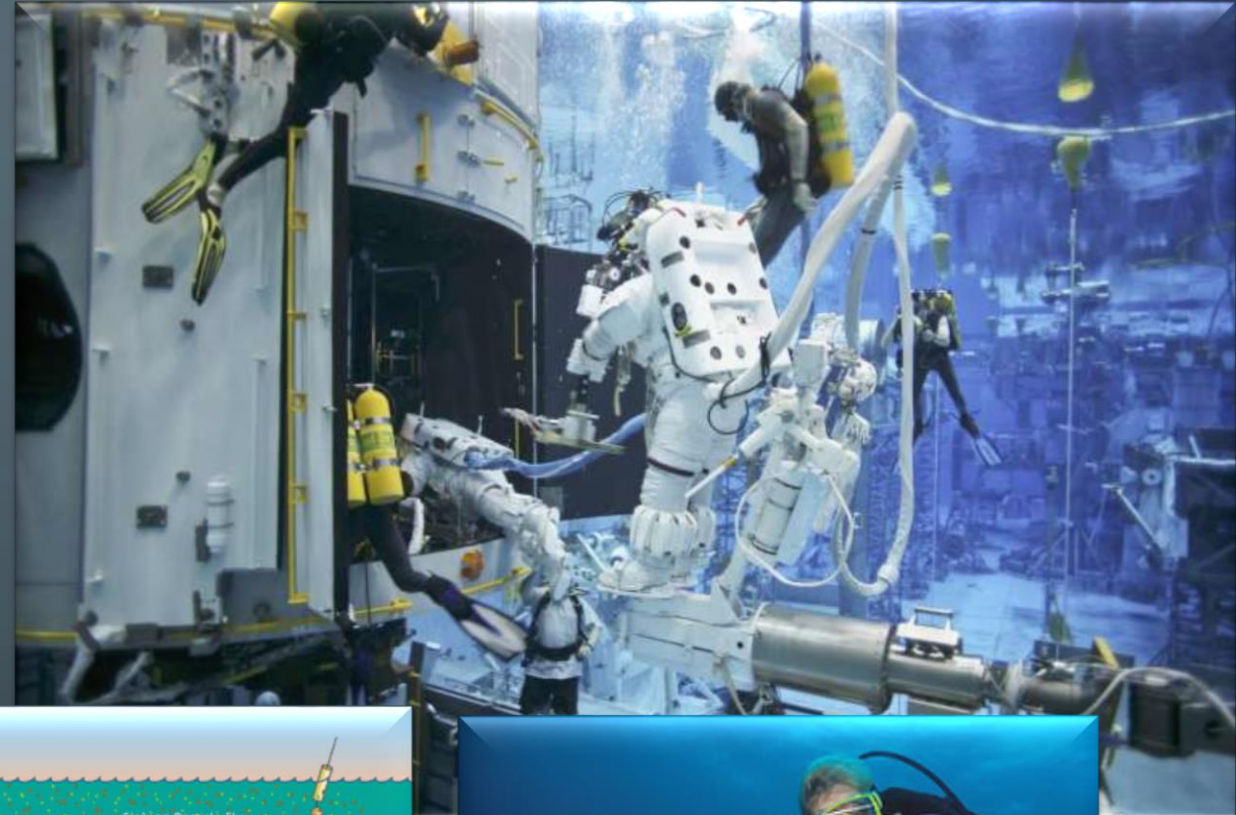
# SCIGIRLS DEEP SEA DIVER

- What does it mean to be neutrally buoyant?
- Balancing act between forces
- Densities are equal
- Which planet would “float” in a giant pool of water?



# REFLECTION

- What worked? Materials?
- Other applicaitons?
- Scuba divers
- Submarines
- Fish
- Science! –Taking ocean measurements







# HOW CAN YOU GET INVOLVED?

- NASA Resources (K-12)
- North Dakota funding and opportunities
- STEM Ambassador Program
- Future Professional Development as a ND teacher

# NASA EDUCATION

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**Space Station**

NASA Astronauts Headline Public Events in Washington Area



**EXPRESS**

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**Search Educational Resources**

Search hundreds of resources by subject, grade level, type and keyword. These lesson plans and teaching materials support your STEM curriculum.

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**Current Opportunities for Educators**

Browse the STEM-related professional development opportunities, webinars, workshops, and ways for you and your students to get involved with NASA.




**Benefits to You**

NASA, UN Photo Competition Highlights #WhySpaceMatters on



**Journey to Mars**

NASA Celebrates Martian New Year in Mars, Pennsylvania



**K-4**

Educators K-4



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## For Students



# NASA for Students

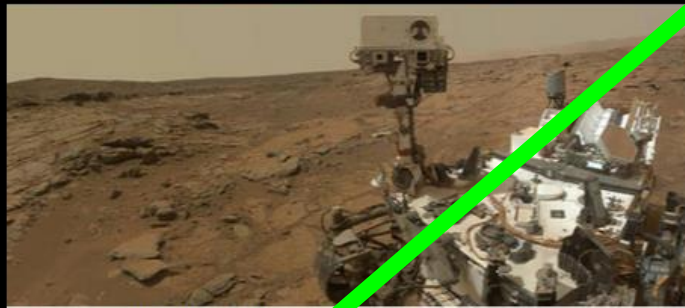
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### Related Topics

[All Topics A-Z](#)

Explore This: Planetary Explorer



NASA Kids' Club



Explore This: Technology




**Now in Space!**  
**Expedition 44**

Expedition 44 is part of a special mission. Scott Kelly and Mikhail Kornienko are staying on the space station for one year!

Planet of the Month: Jupiter -- King of the Planets



# Space Math at NASA



National Aeronautics and Space Administration  
Goddard Space Flight Center

Flight Projects | Sciences and Exploration

## Space Math @ NASA

[Home](#)[Problem Books](#)[STEM Modules](#)[Inquiry](#)

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### Space Math @ NASA

SpaceMath@NASA introduces students to the use of mathematics in today's scientific discoveries. Through press releases and other articles, we explore how many kinds of mathematics skills come together in exploring the universe.

#### Partnering NASA Missions

**Astrophysics:**

- Chandra - [Click here](#)
- Kepler - [Click here](#)
- James Webb ST - [Click here](#)

**Earth Science:**

- SAGE-III - Under development

**Heliophysics:**

- Hinode - [Click here](#)
- IMAGE - [Click here](#)
- MMS - [Click here](#)
- RBSP - [Click here](#)
- THEMIS - [Click here](#)

**Planetary:**

- Cassini - [Click here](#)
- Dawn - [Mission Math](#)
- EPOXI - [Click here](#)
- InSight - [Click here](#)
- Juno - [Click here](#)

#### Partnering NASA Programs

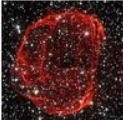
- Eyes on the Solar System - [Click here](#)

### SpaceMath@NASA News Updates


**March:** NASA [Press Release](#) about SpaceMath@NASA- [\[Read Press Release\]](#)  
**July:** New math guide to [Mars Exploration](#) and the Curiosity Rover - [\[Click Here\]](#)  
**August:** Expanded and updated math guide on [Black Holes](#) posted- [\[Click Here\]](#)  
**November:** SpaceMath@NASA served 6,000,000th math problem at the website!  
**December:** New multi-media Grade 6 [Math Modules](#) added- [\[Click Here\]](#)  
**February:** New multi-media Grade 8 [Math Modules](#) added- [\[Click Here\]](#)  
**April:** The 7 millionth Space Math problem is downloaded

#### Math in the News


A behind-the-scenes look at the math in NASA press releases



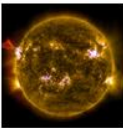
**Problem 517: A Distant Supernova Remnant Discovered**  
Students explore the size and speed of a distant supernova remnant nebula and compare it to the speed of the International Space Station. (PDF)



**Problem 516: Hinode Observes Solar Eclipse from Space**  
Students use the geometry of a solar eclipse to estimate the distance to the sun using simple proportional reasoning. (PDF)




**Problem 515: Telling Time on Mars**  
Students learn about the difference in time between a martian day and an Earth day, and use this to explore how work schedules change for scientists working with the Curiosity rover on Mars. (PDF)



**Problem 514: Solar Flares and the Stormy Sun**  
Students use simple averaging to explore the sunspot cycle and our suns changing activity levels in 2012 and 2013. (PDF)

### Multi-Media Math Modules



**Grades 6, 7 and 8:** Standards-based, multi-media math resources featuring NASA eClips video segments, readings from NASA press releases, online interactive resources, and of course math problems! [\[click here\]](#)


#### Problem Archives


- I - Problems 1 to 38
- II - Problems 39 to 64
- III - Problems 65 to 101
- IV - Problems 102 to 148
- V - Problems 149 to 233
- VI - Problems 234 to 342
- VII - Problems 343 to 428
- VIII - Problems 429 to 478
- IX - Problems 479 to Current

(More problems from 2012-2013)



# International Space Station - Live!

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## International Space Station

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One-Year Crew

SpaceX

Orbital

Commercial Crew Program


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Space Station Tour

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Commercial Resupply

### Space Station Updates



Station Science Ongoing as SpaceX Launch Slips to June 28  
3 days ago

The three inhabitants of the International Space



INTERNATIONAL SPACE STATION  
OFF THE EARTH, FOR THE EARTH

6058 : 10 : 19 : 10


Station Time in Orbit

### Tweets

[Follow](#)


**Scott Kelly** @StationCDRKelly 1h  
#MondayMotivation  
Color your world.  
Good morning from @Space\_Station!  
#YearInSpace  
pic.twitter.com/gp5sC  
Retweeted by Intl. Space Station

Tweet to @Space\_Station



### Commercial Resupply


TV Coverage Set for Seventh SpaceX Resupply Mission to Space Station



### Who's on the Space Station Now?

Expedition 44 & One-Year Crew


Commander Gennady Padalka  
Scott Kelly  
Mikhail Kornienko



### One-Year Mission


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### ISS HD Earth Viewing Experiment

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1198 / \$1,039,431

[LIVE](#)

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**jojokitten**  
minertyler100: no problem there's more ahead  
12 minutes ago

**minertyler100**  
darn missed the sunrise  
18 minutes ago

**minertyler100**  
WOOOAH  
18 minutes ago


**jojokitten**  
love a good sunrise!  
27 minutes ago

**orion**  
Pedro1961: you have right

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[ESA > Our Activities > Human Spaceflight > International Space Station](#)

### WHERE IS THE INTERNATIONAL SPACE STATION?

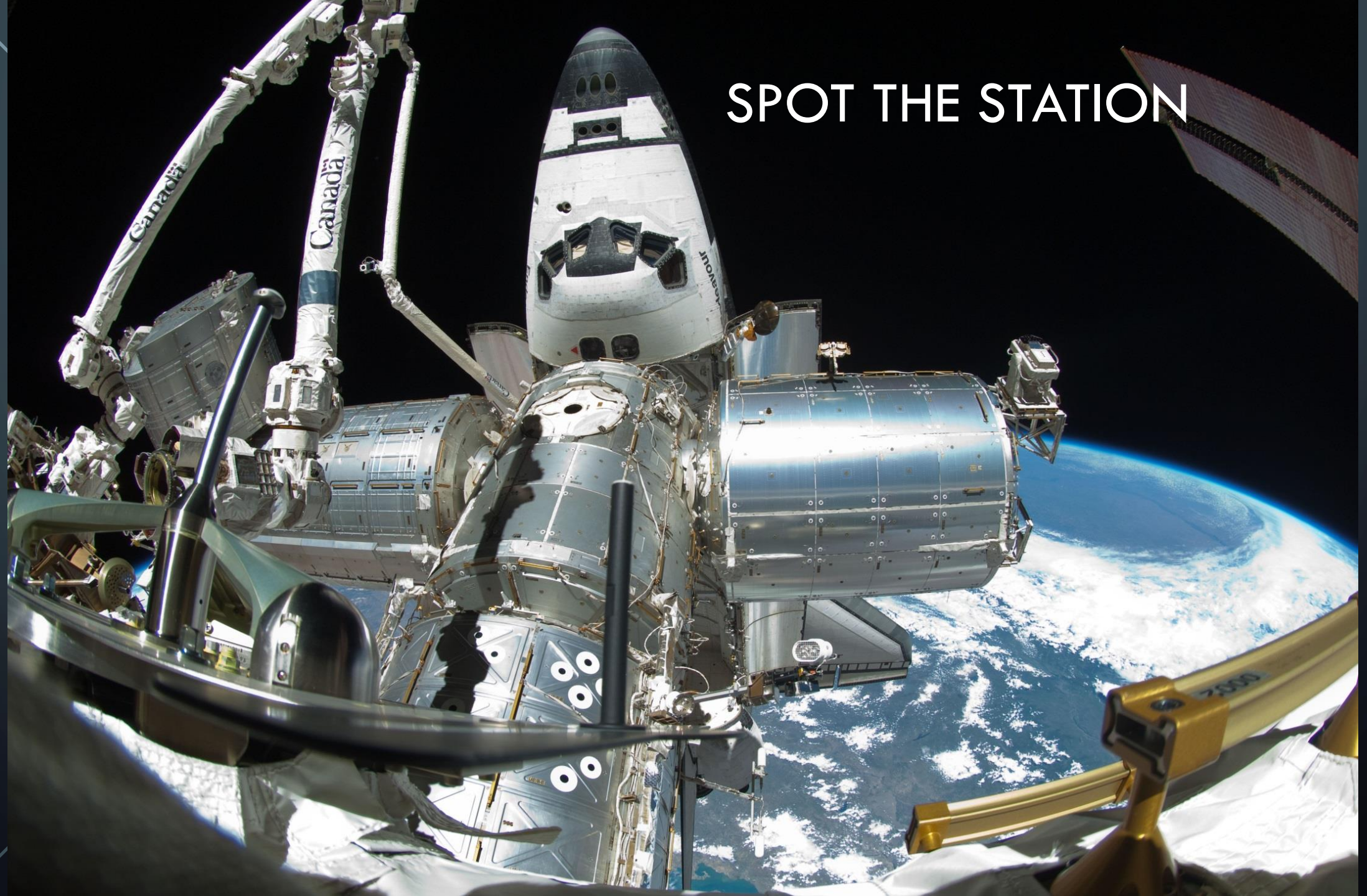


human spaceflight and operations

ces

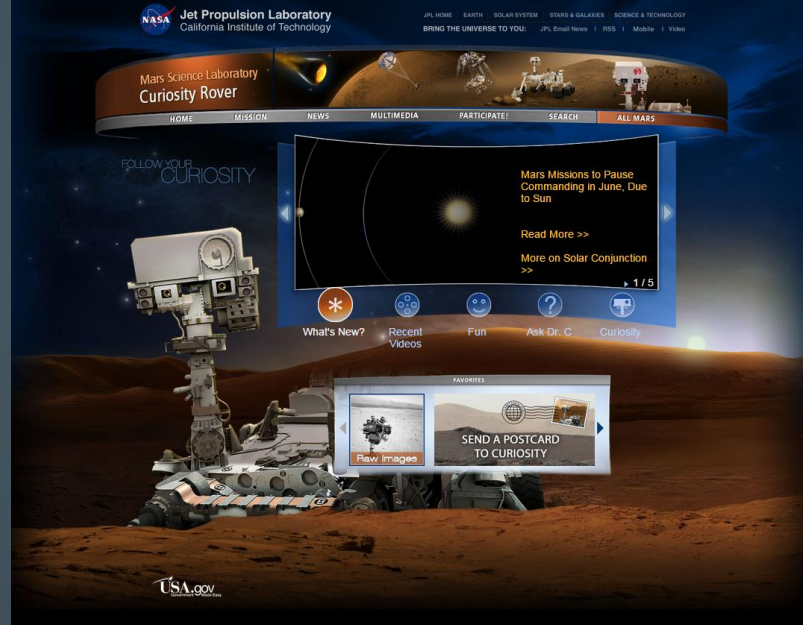


SPOT THE STATION

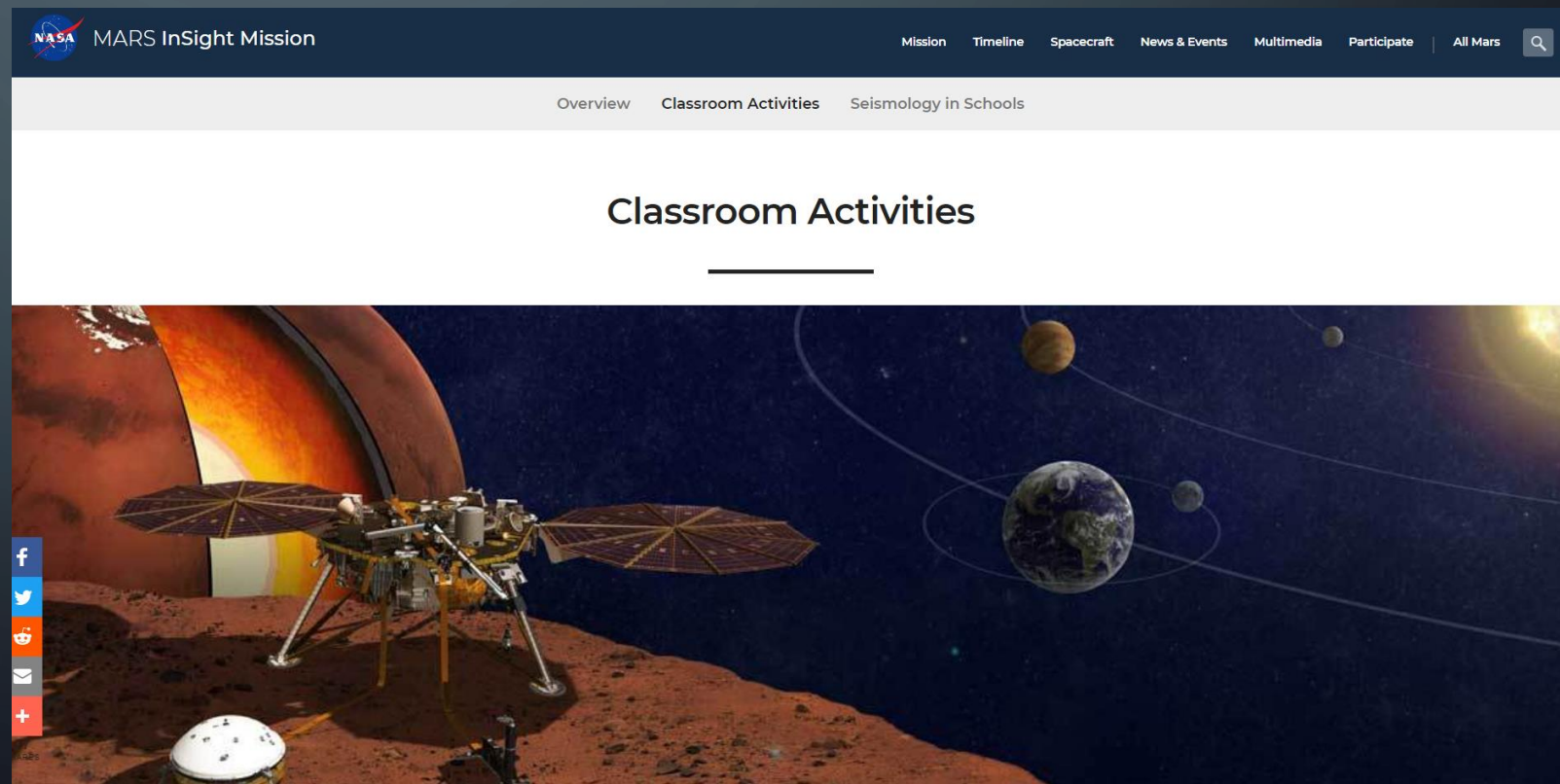




# Mars Curiosity Rover



and now...  
the InSight  
Rover!





# NASA – Lunar Reconnaissance Orbiter

NASA National Aeronautics and Space Administration  
Goddard Space Flight Center

Flight Projects | Sciences and Exploration

LUNAR RECONNAISSANCE ORBITER

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Get animations, streaming video, cartoon characters, audio narration, interactive games!

NASA | Wall•E Learns About Proportions

Moon Concentration  
How Good is Your Memory?

Moon Quiz  
Is it a big hunk of cheese? Take a quiz and find out!

Moon Cookies  
Make these tasty cookies (no baking required)

Unscramble  
Take the Challenge!  
Unscramble Moon-related graphics

Wordsearch  
Help Us Find Our Lost Lunar Words

Moon Calculator  
How much would you weigh if you lived on the Moon?

Crossword Puzzles  
Answer clues and solve the puzzles

Ask Dr. Marc  
Dr. Marc answers questions asked by visitors about the mission and other topics.

Lunar Cryptograms  
Decode these important messages

LRO CRAFTS

Welcome to the  
Space Operations Learning Center (SOLC)

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Mission Operations  
Spacecraft Disposal

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Light from the Sun reaches Earth in around 8 minutes.

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Computing Environments and Collaborative Technologies Branch / Code 585

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SCaaN



# Lunar and Planetary Institute

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## EDUCATION

*and public outreach*

TEACHERS AND FACULTYOTHER SCIENCE EDUCATORSPUBLICABOUT US

### Teachers and Faculty

LPI K-12 Teacher Workshops, Institutes, and Field Trips

Exploration of the Moon and Asteroids by Secondary Students

LPI Summer Intern Program

Humans in Space Youth Art Competition

Educator Resources

Education Newsletter

LPI Higher-Education Faculty Programs



Find upcoming LPI teacher trainings in Earth and space science topics, and connect to resources from past workshops and field trips.

### NEW AND UPCOMING



**Cosmic Explorations: A Speaker Series**  
The Universe is Out to Get Us and What We Can (or Can't) Do About It



**Solar System Exploration Pre-Service Teacher Institute**  
June 23-27, 2014  
Application deadline: June 2



**Mars Through Time Workshop**  
July 8-11, 2014  
at the University of New Mexico

Explore!



# SciGirls Activities



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## Activities

SciGirls has made a commitment to providing quality, gender-equitable, inquiry-based STEM activities that are fun for all! Check out the activities under the following topic areas:

[Earth & Space](#)  
[Engineering](#)  
[Health](#)  
[Life & Environmental](#)  
[Physics & Chemistry](#)  
[Technology](#)

Download the complete guides from Season Three:



SciGirls Participate: Citizen Science Adventures  
 Public participation in scientific research, also known as citizen science, engages ordinary people (kids and adults) in the collection of data for use by research scientists. The activities in this book support and prepare your girls for participation in citizen science.

Download the complete guides from Season Two:

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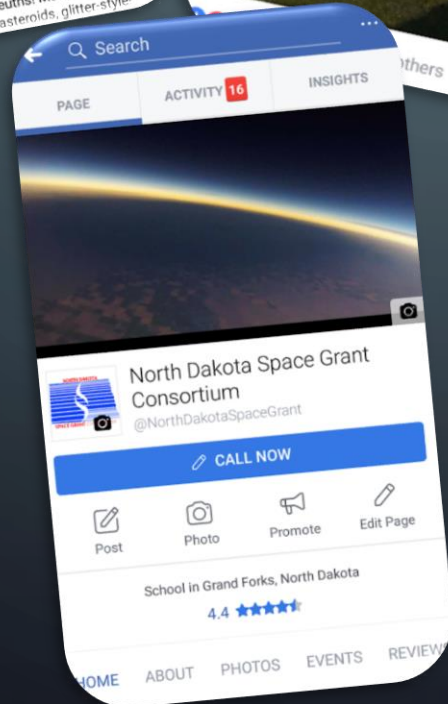
PBS LearningMedia @PBSLrnMedia 8h

What kind of stuff is preserved in a bog?  
 @SciGirls activity/video describes functions of unique wetland environment.





# NDspacegrant.und.edu





# • NDSGC K-12 Educator Email Listserv

- Workshop opportunities
- New STEM education resources for the classroom
- NASA student contests/team competitions
- Professional Development opportunities
- Emails ~once a week





# STEM AMBASSADOR PROGRAM

- Are you volunteering for outreach activities, want NASA on your resume?
  - **May 31<sup>st</sup>** application deadline
  - **\$12/hour** to conduct K-12 visits, informal education sessions, lesson plan prepping, or any other STEM engagement activities.
  - School comes first – **flexible schedule!**
  - Anywhere in ND, from your own local area!
  - **Training session** at UND (lesson plans, hands-on activities, take home materials).
  - Some events are scheduled through Space Grant. Most are whatever you find!
- Some events have been:
    - ISS Calls (2016, 2019 TBD)
    - Eclipse trips
    - K-12 visits with the NDSGC Team
    - Near-Space Balloon Competition judging and facilitation
    - Super Science Day (GF)
    - Marketplace for Kids (all over ND)
    - Water Festival (Bottineau)
    - Girl scouts, boy scouts
    - FIRST Lego League, FIRST Robotics

# PLEASE FILL OUT A QUICK SURVEY

- [https://und.qualtrics.com/jfe/form/SV\\_1ZylfLa4dVilxDt](https://und.qualtrics.com/jfe/form/SV_1ZylfLa4dVilxDt)
- <http://tinyurl.com/y4qxv3cl>
- This helps us for our NASA reporting, so thank you!

