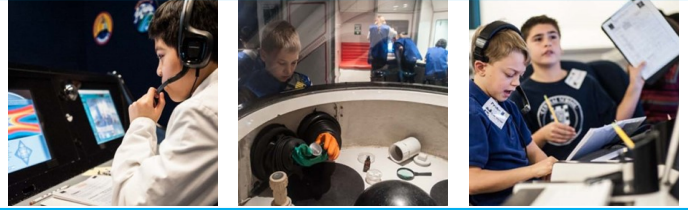




Minnesota Mission Log



Newsletter: Winter 2016

30th Anniversary of the Space Shuttle Challenger Accident

January 28, 2016 marked the 30th anniversary of the space shuttle Challenger accident. Just 73 seconds into flight, a booster failure caused an explosion that resulted in the loss of seven astronauts. This year also marks the 30th anniversary of the Challenger Center organization, which was formed by the families of the Challenger astronauts to continue the crew's legacy of inspiring future generations. Challenger Centers - including the one we are bringing to Minnesota - use space-themed simulated learning environments to engage students in dynamic, hands-on opportunities. These experiences strengthen knowledge in STEM subjects and inspire students to pursue careers in these important fields. While seeing classroom lessons brought to life, students cultivate important 21st century skills like problem solving, critical thinking, communication and teamwork.

The Challenger Center network now consists of over 40 centers worldwide. The Challenger Learning Center of Minnesota was approved to become part of that global network in September 2015. We are currently in the fundraising stage as we work towards our goal of bringing a world-class STEM education center to Minnesota.

We Remember:

- Dick Scobee—Commander
- Michael Smith—Pilot
- Christa McAuliffe—Teacher-in-Space
- Judith Resnick—Mission Specialist
- Ellison Onizuka—Mission Specialist
- Ronald McNair—Mission Specialist
- Gregory Jarvis—Payload Specialist



Credits: NASA

Interviews with Astronaut Curt Brown

Six time NASA astronaut, and Board Member of Challenger Center Minnesota, Curt Brown sat down with KARE 11's Jana Shortal and WCCO's Kim Johnson to talk about the Challenger accident and our efforts to continue their legacy here in Minnesota. Check out these touching, inspiring and informative pieces on our Facebook page, or follow the links below:

Karell Interview: <http://tinyurl.com/KARE11-CLCMN>

WCCO Interview: <http://tinyurl.com/WCCO-CLCMN>

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Touching the future through STEM education.



In the News

Rockets are... Landing??!?!?



Blue Origin's New Shepard rocket approaches landing.

Credits: Blue Origin

If you've seen any recent space news you've no doubt noticed that within the last two months two separate companies, SpaceX and Blue Origin have successfully *landed* rocket boosters -on land! But why is this a big deal?

We can save a bunch of money:

Imagine airplanes that can only fly a single flight? It would cost us Minnesotan's a whole lot more money to go to Florida for spring break if Sun Country had to throw away that beautiful 737 after the trip! Right now rocket parts, even if floated to a gentle landing in the ocean under parachute, must be scrapped after that first flight. The ocean saltwater is extremely corrosive which makes for really rusty rockets. And who wants to fly to space in a rusty rocket! This means a brand new rocket must be built and used for each flight - this is REALLY expensive! If we can reuse rocket stages, we can afford to send a lot more payload and people into space!

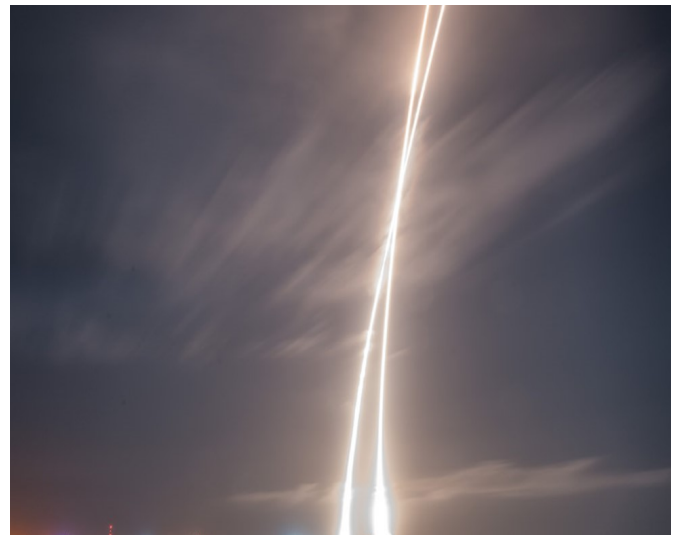
It's the only way to visit other planets :

As hard as it is to land a spacecraft on the Moon or Mars - if we want to send astronauts we need to have a way to get them back home. This means we need to reuse the spacecraft to leave the planet once we've landed - reusability. It's been done before - the

Lunar lander from the Apollo Moon missions did just that... Landed on the moon with our astronauts and then at least part of it lifted back off the moon to get our astronauts back home. We need to do the same thing if we want to visit places like Mars. Though Mars has much higher gravity than the moon ,so our Mars lander will need to be much more capable - more in line with the recent booster technology being tested by companies like SpaceX and Blue Origin. This is why these recent successes are so important, we are one step closer to Mars each time these companies are successful!



Falcon 9 Booster Stage about to touch down safely in Florida—Credit: SpaceX



This long exposure captures the launch into orbit of SpaceX's Falcon 9 rocket, and the booster's first stage return to a smooth landing at Cape Canaveral Air Force Station on Dec. 21, 2015.

Credit: SpaceX



Orion Update



EM-1 Orion Capsule Progress

Orion Capsule frame complete and shipped to Kennedy Space Center in Florida

When you need to move a large spacecraft like the Orion from one place to another what do you do!?! After completing the Orion spacecraft frame in Louisiana, NASA loaded Orion inside an aircraft that can open like Pac-Man, swallow up its cargo, and fly to its destination! The appropriately named aircraft, Super Guppy, flew the newly framed up Orion capsule to Florida earlier this month. While in Florida Orion will spend the next 18 months or so being completed and prepped for its next mission – EM-1 (discussed in the [Fall 2015 newsletter](#)). This preparation will include the addition of over 100,000 components to the spacecraft! Computer systems, life support and navigation systems, etc.



The Orion Spacecraft being removed from NASA's "Super Guppy" aircraft.

Credits: NASA



The Completed Orion Spacecraft frame.

Credits: NASA / Bill White

When ready it will be mounted atop NASA's brand new Space Launch System rocket and sent out for it's EM-1 mission - which will take the Orion and 12 CubeSat's out to deep space - a 21 day mission around the Moon and back!

Check with your parents before viewing this sneak peek of the video animation of the EM-1 mission here:

<https://www.youtube.com/watch?v=qdxeDdwmEb0>

How Can You Help?

- > Visit our website for more information and contact us to learn how you can get involved.
- > Sign up for an Individual or Family Membership, or consider a donation - information on the website: www.challengermn.org/membership.html
- > Help us get the word out!



"I touch the future. I teach."

**-Christa McAuliffe,
Challenger
Astronaut**



Eyes on the Skies: Northern Lights (a.k.a Aurora Borealis)

Winter can be really cold and bitter here in Minnesota. But just maybe – one of those cold bitter nights could pay off with a beautiful viewing of the Northern Lights? The Northern Lights, or Aurora Borealis, is truly a beautiful phenomena, but it is rare to spot even here in Minnesota. But it is possible and thanks to modern technology, it's a little easier to catch these rare events than it was in the past.

What is the Aurora? In early times, it was thought by native peoples that it was the spirits of ancestors dancing, or even gods building a fire bridge to the sky. In reality, we now know storms occurring on the Sun (93 million miles away!) send gusts of charged particles at the Earth. These particles create a reaction in the Earth's atmosphere - actually similar to the type of reaction used in the tubes of neon signs – Just on a much bigger scale to fill the night sky. Often the Aurora may appear as arcs or spirals of light. Strong displays may have vivid red and violet colors.



When should we look for an Aurora here in Minnesota?

Winter here in Minnesota actually is the best time to look. Long, clear nights give us the best chance to view an occurrence since the Aurora's can't be seen in the daylight hours. But when should we decide to head outside and look up? There are several great relatively new resources we can use online to give us the best chance to spot an Aurora:

University of Alaska Fairbanks (UAF) Link:

<http://www.gi.alaska.edu/AuroraForecast/NorthAmerica>

UAF offers nightly forecasts of Aurora activity for about 7 days in advance.

And—keep an eye on our ChallengerMN Facebook page – if we see a good opportunity for viewing we'll be sure to let everyone know! www.facebook.com/challengermn

Family Science Experiment: Magic Milk!

This Magic Milk science activity is a lot of fun and a great introduction to chemical reactions!

You will need:

- A large plate or pie pan
- 1/2 c. - 1 c. milk (Whole or 2% works best)
- 1 drop of dishwashing soap
- Food coloring (Red, Blue, Green, Yellow)
- Toothpicks or Cotton Swabs (optional)



Mixology: Pour the milk onto the plate making sure to cover the base of the plate completely with milk (1/4" depth). Add a few drops of each of the different food coloring to the milk, keeping the drops close together near the center of the plate. At this point you can talk to your child about the following:

- Hypothesis: What do they think is going to happen when they add a drop of dishwashing soap to the milk?
- What colors will mix together to form new colors?

Watch the magic happen! Carefully add one drop of dishwashing liquid to the center of the milk/food coloring mixture. Very quickly you will see a chemical reaction occur— the colored drops will begin to spread away from the dishwashing liquid drop and begin mixing and churning all the colors together! This reaction will continue for some time, but the child can now use a toothpick or cotton swab to create their own awesome colorful explosions!



What's really happening? Milk is mostly water but it also contains vitamins, minerals, proteins, and tiny droplets of fat suspended in solution. The fat droplets are sensitive to changes in the milk. When the dish soap is added, it weakens the chemical bond that holds the fats in the milk. Part of the soap molecule doesn't like water so it attaches to the fat droplet in the milk. As the water-fearing soap molecule races around trying to attach to fat droplets the molecules are bumped and shoved everywhere, making an awesome reaction! As the soap becomes evenly mixed with the milk the reaction slows down and stops. The higher-fat milk you use, the better the reaction! Enjoy!