AFRL La Luz Academy

"Creating the Possibilities"

Inspiring Future Scientists and Engineers

Star Date: October 2011
Volume IX, Issue 2

In This Issue...

The Rocket Report

Former DoD STARBASE Students from NM Speak at Congressional Event

On 14 September 2011, three former DoD STARBASE students from New Mexico spoke at the Business and Industry STEM Coalition's Youth in Science, Engineering and Technology event in Washington, D.C.

Lana Kimmel participated in AFRL La Luz Academy's DoD STARBASE Flight in 2006-07 with South Mountain Elementary School. In May 2011, Lana and her three teammates placed 4th in the national Team America Rocketry Challenge (TARC). Her team successfully built and launched a rocket that carried an egg to 750 feet and delivered that egg safely back to Earth in 45 seconds.

Siblings Haley and Jack Hanson also participated in the DoD STARBASE Flight; Haley in 2006-07, and Jack in 2008-09, as home-school students. They were recognized by the President at the White House Science Fair event in October 2010 for their computer skills. Jack and Haley designed a survival computer game using the Spore™ video game platform, winning first place in the Game Changers Kid Competition. Haley wrote the script and text, and Jack developed the game's logic and and designed creatures and scenery.

L to R: Senator Tom Udall, Haley Hanson, Lana Kimmel, Jack Hanson, and Senator Jeff Bingaman.

At the STEM Coalition event, Lana, Haley, and Jack discussed their experiences participating in the DoD STARBASE program. New Mexico Senators Jeff Bingaman and Tom Udall congratulated the three students on their accomplishments.

Flights are Now In Session

DoD STARBASE and TECH Flight classes are now in session at AFRL La Luz Academy's classroom facilities.

Meanwhile, Robot Systems Flight students are beginning to participate from their eighth grade school classrooms. See pages 2 and 3 for more details.

Blogs have been established for these Flights, giving teachers and students the ability to interact with us and each other using social networking sites on the internet.

Is Mars Melting? No, It's Just the Mars MELT Mission

In 1972, Apollo 17 astronauts brought samples of titanium-rich "orange soil" from the *lunar maria*—the dark areas of the moon—back to Earth.

A few grains of this soil contained *melts* (or "*melt inclusions*")—tiny globules of lava from the mantle in the moon's interior brought to the surface by volcanic activity, preserved and encased in crystal.

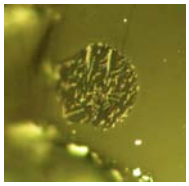


Image of a Melt
Credit: Saal Lab—
Brown University

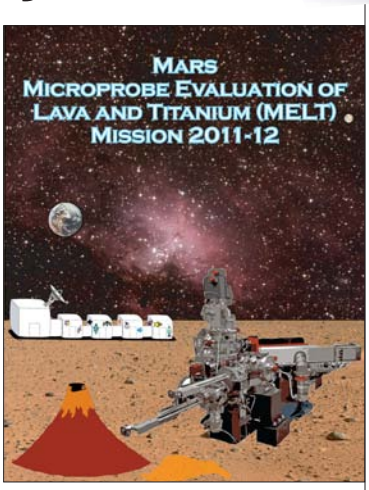
(It's something like the way ancient mosquitos were preserved in "amber"—fossilized tree resin—as shown in the movie *Jurassic Park*.)

Recently, with a special instrument called an *ion microprobe*, scientists used *secondary ion mass spectrometry* to analyze these melts in a way no one ever had before.

This analysis, to their surprise, indicated that there is much more water (a valuable commodity for space missions) underground inside the moon than suspected—billions of gallons, the same as in Earth's upper mantle!

Mars is known to have titanium-rich lava deposits similar to the ones on the moon.

Scientists participating in the **Mars Microprobe Evaluation of Lava and Titanium (MELT) Mission** will look for Martian melt samples and analyze them with an ion microprobe developed by the Directed Energy and Space Vehicles Directorates of the Air Force Research Laboratory to see if the interior of Mars also contains relatively large amounts of water.



Scientists and engineers responsible for supporting the Mars MELT Mission will require a colony of long-term living quarters and food on Mars. Fifth grade students participating in the 2011-12 Mars Missions Flight will plan and build the necessary facilities and life support resources for these researchers, and present them at the culminating Link-Up Day event in the spring.

Grant Opportunity

Mars Missions teachers, need funds for Link-Up Day transportation costs? The Air Force Association (AFA) awards aerospace education grants of up to $250 each year.

Grant applications must be completed and submitted online. The deadline is 5 pm Mountain Time Wednesday, 9 November 2011.

For more information, or to register and log on, visit www.afa.org/aef/aid/educator.asp.

Engineering and Math the Focus of Day 1

Students focus on engineering and math during DoD STARBASE Flight Day 1.

The participating fifth and sixth grade elementary students use hands-on engineering skills and Newton's laws to design a safety restraint system to protect brave shuttle pilot Eggbert as he crash-lands on Earth.

Students find themselves using tools such as *graduated cylinders, protractors, scales,* and *rulers* to complete a Metric Mission.

In addition, they apply geometric concepts like *plane, isometric, extrude, horizontal, vertical, perpendicular,* and *aligned* as they construct a model of a space station module using PTC Pro/ENGINEER® software.

Blog Log

DoD STARBASE Flight teachers, check out the latest on the DoD STARBASE Flightblog (http://dod-starbaseflight.blogspot.com; sign in with your g-mail account). See the September 2011 issue for more details.

You'll see a Flight calendar, Day 1 photos, and other information. If you have any comments, questions, or quotes, feel free to post them on the blog, too!

Putting the "T" in "TECH Flight"

The "T" in TECH Flight stands for "Technology," (the whole name is actually Technology and Engineering Challenges Flight) but to the sixth and seventh grade students participating in Day 1, the "T" must have seemed like it stood for "Teamwork!"

Students prepared, in teams, for Rocket Launch day by assembling the six-foot rockets they will be launching on Day 2, while other student teams used a program called *RockSim* to simulate the rocket's flight.

Then student teams completed a *Global Positioning Satellite (GPS)* activity; which prepared them for when they use GPS units at the launch.

The students also used teamwork to operate a set of multiple-user Intergalactic Skis ("One, two, three, *right!* One, two, three, *left!*")

Rocket Launch Approaching

The first semester Rocket Launch event is approaching fast. Those six-foot rockets you've been building? They're scheduled to be launched on **25 October 2011** (with a make-up day on 26 October). It'll be a *blast*!

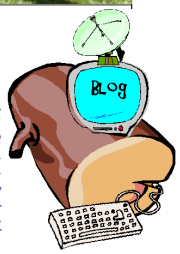
Teachers, call the **Rocket Launch Hotline** at **(505) 401-5456** on the morning of the event to verify that launch is a "Go." To contact us, call **Ms. Diane MacAlpine at (505) 228-9930**. Note: Our office is closed on Rocket Launch Day.

Please have all your students wear their red t-shirt uniforms that day, also! It's part of our safety plan.

It can be cold, then hot, dusty, and dry out there in the New Mexico desert; there's no running water (although portable bathroom facilities will be available). Small cactus and similar objects can occasionally be found in the area; thus, sandals and flip-flops are *not* recommended footwear.

Items to consider bringing: weather-appropriate layers, bottled water, sunscreen, sun hats—oh, yeah, and don't forget to bring your *lunch* to the *launch*!

Blog Log



TECH Flight teachers, check out the latest on the TECH Flight blog (http://afrltechflight.blogspot.com; sign in with your g-mail account). See the September 2011 issue for more details.

You'll see a Flight calendar, Day 1 photos, and other information. Please post your TECH Flight/ Rocket Launch comments, questions, quotes, pictures, and videos on the blog, too!

Robot Systems Flight

Now It's Your Students' Turn

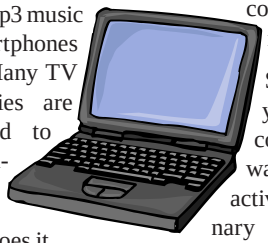
OK, Robot Systems Flight teachers, now it's your students' turn to learn how to build and program Boe-Bot® robots. Along the way, your students can explore related topics such as the *history* of computers, how computers are examples of a *system*, and *binary math*.

Have your students take the pretest and mail the results to us. Also, have each team create a g-mail account and email the team name to us, so they can submit their answers to the challenges posted on the blog.

Welcome to the Digital Age

Have you noticed how everything is going *digital* these days?

Many watches are now digital watches. Digital mp3 music players and smartphones are all the rage. Many TV shows and movies are digitally streamed to television and computer screens.



But what exactly does it mean when we say something is "digital?"

The word "digital" comes from the word *digits*. And what are digits? *Numbers*. Specifically, two numbers in this case: *one* and *zero*, also known as the *binary* or *base 2* number system.

That's right--all those digital watches, songs, movies, and even video games and emails are made using nothing but lots and lots of ones and zeros. This is how all computers think at their most basic level.

So as you're teaching your students about computers, you may want to throw in some activities that involve binary numbers and binary math.

Welcome to the digital age!

Blog Challenges

Robot Systems Flight teachers, check out the Robot Systems Flight blog—http://robotsystemsflight.blogspot.com. Sign in using your g-mail sign-in information. See the September 2011 issue for more details.

Every month there will be a new series of challenges posted on the blog. The challenges this month include:

- A challenge involving extending the computer tmeline past 1989.
- A challenge involving taking two binary numbers and adding them together.
- A challenge to email a picture of your completed Boe-Bot® with your team...so hurry and complete the Boe-Bot® assembly!

See the blog for more details. Don't forget to check for new challenges every month, too!

AFRL La Luz Academy

AFRL La Luz Academy
PO Box 9556
Albuquerque, NM 87119

(505) 846-8042
AFRLLaluzAcademy@Kirtland.af.mil

Web: http://prs.afrl.kirtland.af.mil/LaLuz/

Important Terms and Acronyms

AF: Air Force

AFB: Air Force Base

AFRL: Air Force Research Laboratory

AFRL/RD: The Directed Energy Directorate of the AFRL (formerly AFRL/DE)

AFRL/RV: The Space Vehicles Directorate of the AFRL (formerly AFRL/VS)

DoD: Department of Defense

KAFB: Kirtland Air Force Base, Albuquerque, N.M.

LF: Leadership Flight

MELT: Microprobe Evaluation of Lava and Titanium

PRS: Phillips Research Site

PWN: Pinpoint WeatherNet

STEM: Science, Technology, Engineering, and Math

TECH: Technology and Engineering Challenges

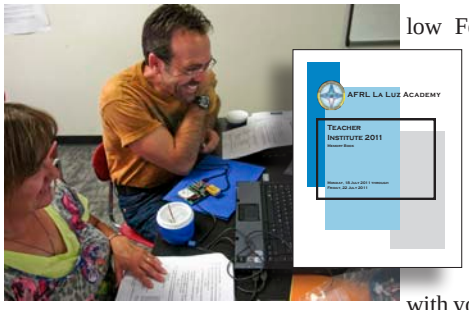
T²: Technology Transfer

TTE: Technology Transfer for Education

USAF: United States Air Force

Teacher Institute

Teacher Institute News



Wondering how your fellow Teacher Institute (TI) Fellows are applying themselves now that the summer workshop is over?

Well, as of this writing, the current stats are: 1 Fellow has registered for the Mars Missions Flight, 3 are involving their students in the DoD STARBASE Flight, 4 are involving their students in the TECH Flight, and 10 are involving their students in the Robot Systems Flight.

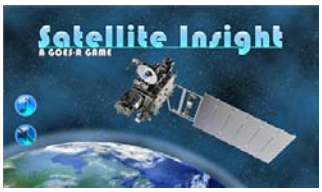
Can't remember what your fellow Fellows even looked like? No problem. The Teacher Institute Memory Books for this year are in!

Some of you are getting your Memory Books in person when you come with your class to AFRL La Luz Academy, but many more of you are getting them in the mail. They've already been sent out, so let us know if you didn't get yours.

If you plan to develop a STEM lesson plan for the school year based on one or more concepts from the Institute, please let us know the details by 7 October 2011. We can provide support and resources to help you. Thanks to those who have already let us know!

TI Blog News

Hey, Fellows, have you checked out the TI blog lately? There's a link to an interesting website called Sci-Jinks. It has lots of information and videos gathered from satellites.



It also has video games about satellites, such as Satelllite Insight, in which you have to keep up with the data coming in from the GOES-R weather satellite. You can even play this game on an iPhone!

If making a STEM lesson plan, please blog which topic it's on and give a brief description of the lesson. Post any pictures or videos of your classroom implementing your lesson plan to the blog as well. Thanks!

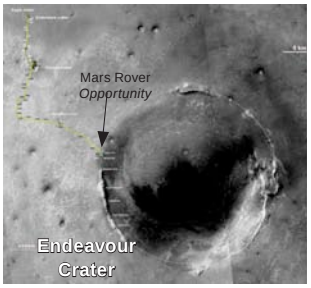
STEM Bytes

Opportunity Endeavors to Study Endeavour's Geologic Opportunity

The Mars Rover *Opportunity*, after having driven over 33 kilometers across Mars, has reached a gigantic crater called Endeavour, the biggest crater by far the rover has ever visited.

According to Dr. L. S. Crumpler from the Mars Rover team, "The rim of Endeavour represents rocks from the earliest history of Mars (the *Noachian*) when there was a lot more water available and the water was relatively neutral *pH*.

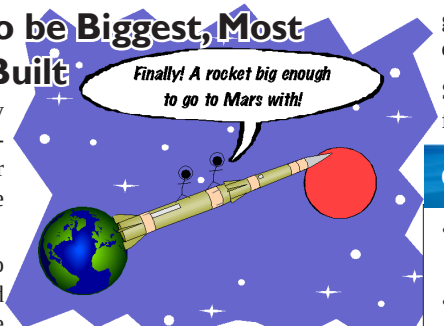
"The conditions on Mars were probably close to those present on Earth at that time. And there is evidence from orbital data that clay minerals occur in the rim of Endeavour.



"So, while the media and reports have all focused on the arrival at a big crater with a scenic view, we have been more focused on the new geology here at the rim of Endeavour crater."

See www.jpl.nasa.gov for more information.

Mars Rockets to be Biggest, Most Powerful Ever Built



Plans were unveiled recently for a new generation of rockets, with a capsule on top for astronauts, called the Space Launch System.

The rockets will be able to carry 143-165 tons of payload into space, making the Space Launch System the biggest, most powerful rocket design ever made.

Test flights are scheduled to begin in 2017, manned asteroid missions in 2025, and manned missions to Mars in the 2030s.

See www.jpl.nasa.gov for details.

Coming Next Issue...

- Mars Teachers Trained and Ready
- DoD STARBASE Day 2 activities
- Rockets Away!

Watch for it!