AFRL La Luz Academy

"Creating the Possibilities"

Inspiring Future Scientists and Engineers

Star Date: October 2010
Volume VIII, Issue 2

In This Issue...

The Rocket Report

AIAA Anaheim: Awesome!

The American Institute of Aeronautics and Astronautics (AIAA) Space conference was held in Anaheim, California 31 August to 2 September 2010. AFRL La Luz Academy was there, and it was awesome!

Several thousand students and visitors, including many home school students, visited AFRL La Luz Academy's booth at the event and participated in an interactive demonstration of cryogenics from the Air Force Research Laboratory (AFRL)'s Mr. Tom Fraser. He helped the students flash-freeze items such as marshmallows, balloons, flowers, and popcorn in some cold liquid nitrogen.

Deputy Director Ms. Diane MacAlpine had the students and visitors seeing red. Infrared, that is. Students viewed themselves and various objects through the eyes of a Forward-Looking InfraRed (FLIR) camera.

In addition, Mr. Steve Burke had students and visitors answering science, technology, engineering, and math (STEM) trivia questions, exploring the properties of air in a Tornado Tube, and helping them learn to think like a computer with an interactive binary activity.

The students and visitors were rewarded with some AFRL La Luz Academy newsletters, brochures, pins, balloons, aliens, and other awesome giveaways.

Mars Missions Flight

Mars Cave Skylight Investigation (CSI) Mission 2010-11

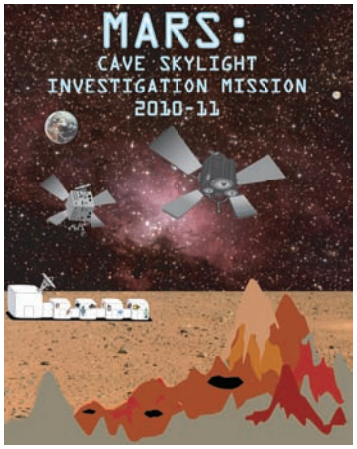
The Evidence Doesn't Lie-- This Year's Mission is Mars: CSI

The evidence doesn't lie. Scientists and engineers studying Mars have discovered that some Martian caves, carved from molten lava digging tunnels through mountain rock, have a natural hole, or "skylight," in the cave roof. This discovery provides the theme for this year's simulated Mars Missions Flight:

To find out where else on Mars such caves might be, and what materials or deposits they might contain, Mars Missions Flight scientists participating in the Mars: Cave Skylight Investigation (CSI) Mission will fly an Unmanned Arial Vehicle (UAV) over the Martian surface, searching for skylights.

The UAV, a next-generation spacecraft, will be tracked from stations on Mars and Earth using Space Control and adaptive optics technologies developed by AFRL's Directed Energy Directorate.

Once a skylight cave is located, the UAV hovers over it using AFRL Space Vehicles Directorate nanojets for positioning and attitude control. The tracking stations then relay the UAV's position to the CSI Mission scientists on Mars.



Based on preliminary data transmitted from the UAV, the Mars: CSI scientists attach appropriate plug-and-play sensors, as needed, to a second UAV, and send it out to perform a more detailed aerial investigation of the cave. Meanwhile, the first UAV continues on to search for more skylights.

Scientists and engineers responsible for supporting the Mars: CSI Mission will require a colony of long-term living quarters and food on Mars.

Fifth grade students participating in the 2010-11 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.

So, if anyone tries to talk you into looking for skylights on Mars, you may want to cave in. Yeaaaaaaaaaaaah!

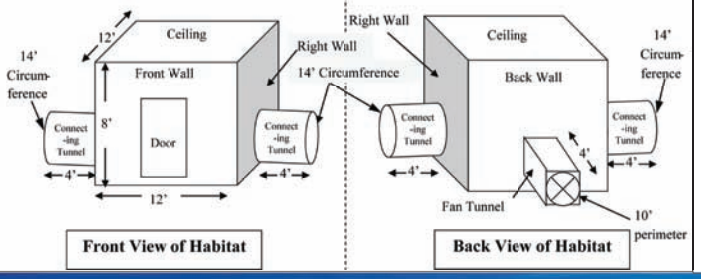
Tunnel Tweak Twist at Teacher Training

A teacher training "refesher course" was held on 29 September 2010 for teachers with previous Mars Missions Flight experience. Director Ronda Cole reviewed the Mars Missions Flight process and distributed updated manuals and other materials.

Ms. Cole also informed them of a new tweak this year: instead of one big 8' connecting tunnel, habitats will each have two 4' connecting tunnels, one on each side.

To accomodate this change, Team A is now responsible for the front wall, airlock, and floor, while Team B will bring the left and right walls and the two connecting tunnels.

Team C will be the same as last year, bringing the ceiling, back wall, and fan tunnel.



Free Money!

Mars Missions teachers, need money for bussing? 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 Friday, 10 November 2010.

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

DoD STARBASE Flight

Sixth Grade Students Build Six Foot Rockets

During the first semester DoD STARBASE Flight Day 1, sixth grade students work in teams to assemble six foot rockets using components such as *booster tubes, bulkhead plates, centering rings, payload tubes, couplers, fins, fin wraps, and nose cones.*

The students run a computer simulation of the anticipated flight of the rocket. They choose a rocket name from the following list: *Apollo, Atlas, Gemini, Mercury, Opportunity, Phoenix, Saturn,* and *Spirit.* Then the teams decorate their rocket using name decals and stickers.

When students launch these rockets later this month, they'll use Global Positioning Satellite (GPS) units to determine the distance the rocket landed from the launch pad.

During Day 1, the students complete a hands-on GPS activity similar to what they'll do on Rocket Launch Day.

Prepare to Launch!

The first semester Rocket Launch Days are coming fast, October 12 and 13 (and a make-up day on October 14) this year.

Teachers, don't forget which day your class is scheduled to launch. Also, make sure your students wear their yellow uniforms.

Items to consider bringing include: weather-appropriate layers, bottled water, sunscreen, sun hats, and lunch!

PETES PRS Flight

Providing Engineering and Technology Experiences for Students Phillips Research Site Flight

Setting a Light Mood

Seventh grade students attending the Providing Engineering and Technology Experiences for Students (PETES) Phillips Research Site (PRS) Flight Day 1 are setting a light mood by studying waves and the electromagnetic spectrum, including visible and invisible portions of the spectrum.

Students learn the parts of a wave—*crest, amplitude, wavelength, trough* and *node*—and make various types of waves, including *transverse* and *longitudinal*, using spring coils.

Then the seventh graders explore properties of light.

For example, students experiment with lightboxes, combining different colors in an attempt to make white light. The students bend laser light through gelatin lenses they create themselves. They also explore the effects of ultraviolet (UV) radiation with the help of UV beads and frisbees.

Intro to Systems Engineering Flight

Let's Get Digital

Have you noticed how everything is going *digital* these days? For example, do you:

- Own a watch? There's a good chance it's a *digital* watch.
- Own an mp3 player? It plays *digital* music.
- Download movies from the internet into your computer or television system? Those are *digital* movies.
- Play video games on a computer or gaming console? Those are *digital* programs.

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

Well, for starters, the word "digital" comes from the word *digits*. And what are digits?

Numbers.

See, computers don't think in words or images like people do, they think in numbers! In fact, when you get right down to it, all computers think using a *binary* number system...meaning using only *two* numbers!

That's right--all those digital watches, songs, movies, and video games are made using only two numbers. Which numbers? *One* and *zero.*

To make their Boe-Bot® robots understand what they want them to do, eighth grade students participating in the Intro to Systems Engineering Flight learn how to think like a computer.

So, on Day 1 of the Intro to Systems Engineering Flight, we teach them the history of computers, and then we show them how to do something called *binary math*, using only ones and zeros--just like computers do!

After that, we teach them a little computer programming, and they're off to the races. The students start assembling their Boe-Bot® robots and programming them to maneuver through a series of increasingly challenging obstacle courses on Day 2.

And with that, the eighth grade students can truly say they have entered the *digital age*!

Phillips Challenge Flight (formerly the SPACE Flight)

A Systems Engineering Approach to STEM Projects

Teacher Orientation Held

On 23 September 2010, high school teachers participating in the 2010-11 Phillips Challenge (formerly SPACE) Flight attended the Teacher Orientation session at AFRL La Luz Academy.

Director Ronda Cole discussed the Phillips Challenge Flight systems engineering process and milestones, and gave the teachers some input as to how to get their students up to speed on selecting their STEM project.

The Teacher Orientation attendees also discussed names for the major milestones. It was agreed that the first review should be called the Critical Design Review (CDR), and the second review should be called the Qualifying Review (QR).

The next major milestone is the Kickoff Briefing, 28 October 2010. Student teams, teachers, and technical advisors will meet and develop a strategy for working on their STEM project.

In the meantime, major action items for Phillips Challenge Flight participants include:

- Identify and recruit student participants
- Schedule a regular meeting place and time for your team
- Identify a topic for your STEM project
- Identify technical advisors already on board, or technical assistance needs
- Make plans to attend the Kickoff Briefing

Teacher Institute News

OK, Teacher Institute participants! You've attended the summer workshop, you've prepared a lesson plan to take some of the ideas you learned back to your classroom, now it's time to implement this plan with your students, and get them excited about STEM.

Memory books will be going out in the near future, to help you relive some of those wonderful moments at the summer workshop.

Deputy Director Ms. Diane MacAlpine will be visiting with you soon to see how you're coming along.

Materials orders are due by 10 December 2010.

Don't forget to RSVP for the 19 October 2010 meeting from 4-6 pm. Pizza will be served!

AFRL La Luz Academy

AFRL La Luz Academy
PO Box 9556
Albuquerque, NM 87119

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

Website: www.vs.afrl.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)

CSI: The Mars Cave Skylight Investigation mission

DoD: Department of Defense

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

LF: Leadership Flight

PETES: Providing Engineering and Technology Experiences for Students

PRS: Phillips Research Site

R&D: Research and Development

STEM: Science, Technology, Engineering, and Math

TI: Teacher Institute

T²: Technology Transfer

TTE: Technology Transfer for Education

USAF: United States Air Force

STEM Bytes

"Goldilocks" Planet Found!

Just recently, our friends at NASA's Space Place asked this question:

The Astro2010 Decadal Survey, published by the National Research Council (NRC) of the National Academy of Sciences, recommends that the search for Earth-like planets around other stars be among astronomy's top priorities in the coming decade.

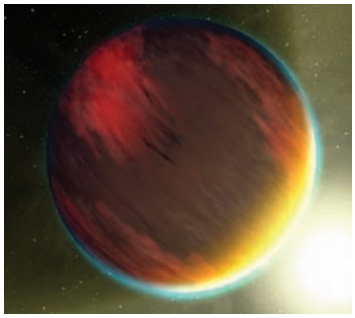
Nearly 500 exoplanets have been discovered so far, although none of them Earth-like.

But with the new technologies now bent to the task, can the discovery of a sister Earth be far off?

Well, it didn't take very long at all to answer *that* question!

Scientists and astronomers have recently discovered a "Goldilocks" planet, and it's not that far from Earth!

The planet, called "Gliese 581g," is the sixth planet found circling a dwarf star in the Libra constellation called Gliese 581. It's only about 120 trillion miles away, which sounds like a lot, but is actually very close to us, cosmically speaking. A year on this planet is only 37 days long.



Artist's rendering of a recently discovered planet whose atmosphere contains the basic chemistry for life. The Goldilocks planet recently discovered may look even more like Earth.

It was discovered by astronomers R. Paul Butler and Steven Vogt. It orbits the star right in the middle of a special zone scientists call... no, not *the Twilight Zone*...but *the Goldilocks Zone*.

This planet is not too close to the sun, and not too far. Not too hot, not too cold. Not too big, not too small. It's juuuuuust right.

In other words, it's the very first planet besides Earth ever found whose conditions are absolutely ideal for supporting life! This planet could contain liquid water, and could have the proper surface, gravity, and atmosphere to support life.

Even if it's just a simple single-cell bacterium, it would officially mean that We Are Not Alone.

Mr. Vogt doesn't care much for the name "Gliese 581g," so informally, he has named it ater his wife. He calls it "Zarmina's World."

It's unknown whether water actually exists on "Zarmina's World," or what kind of atmosphere it has.

But because conditions are ideal for liquid water, and because there always seems to be life on Earth where there is water, Mr. Vogt believes "that chances for life on this planet are *100 percent*."

For more information, see www.nasa.gov/topics/universe/features/gliese_581_feature.html.

Coming Next Issue...

- Base Operations begin
- Sixth graders launch rockets
- Phillips Challenge Flight Kickoff Briefing

Watch for it!