AFRL La Luz Academy

"Creating the Possibilities"

Inspiring Future Scientists and Engineers

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The Rocket Report

AFRL La Luz Academy is Off and Running Again

Well, looks like another school year has started, and AFRL La Luz Academy is off and running again.

The Mars Missions Flight, for fifth graders, has a brand new mission; the Mars Missions Manual is being updated and printed; and new and returning Mars Missions Flight teachers will be attending training sessions later this month. See page 2 in this newsletter for more details.

The DoD STARBASE Flight is sure getting egg-citing; fifth grade students are applying engineering design principles to the laws of motion to keep brave space shuttle pilot/hero Eggbert safe during some pretty rough landings. See page 2 for details.

The impact of the DoD STARBASE 2.0 afterschool program for middle schoolers doubled down with the return of Van Buren Middle School to the fold, and the addition of Wilson Middle School. Now two schools can get their school year started with a bang, as they design and build bigger and better rockets until they're ready to compete in this years' Team America Rocketry Challenge competition. See page 2 for details.

Technology and Engineering Challenges (TECH) Flight middle school students are also getting in on the rocket building game this semester,

simulating the flight of and constructing their own six-foot rockets, which they will launch later this month! See page 3 for details.

Robot Systems Flight middle school teachers attended a Robot Systems Flight Orientation meeting to learn the goals and expectations of the school-based robotics activity. And they didn't even have to memorize the phrase, *"Gort: Klaatu barada nikto!"* See page 3 for details.

The STEM Challenge Flight, for high schoolers, kicked off what promises to be another egg-cellent year with Coach Orientation, Mentor Orientation, AND Kickoff Briefing meetings. Whew! See page 3 for details.

Mars Missions Flight for fifth graders

Mars Microbial Asteroid Research Survey (MARS²) Mission 2012-13

Mars MARS Mission Follows Up on Curiosity's Curiosity

In 1972, Apollo astronauts brought back a collection of lunar rocks called *regolith breccias* (rocks from the lunar "topsoil" (regolith) composed of pieces of older rock (breccia). Some of these rocks contained fragments of ancient lunar *impactors* (objects that collided with the surface).

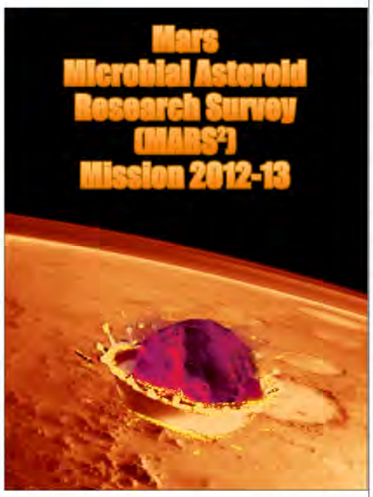
By analyzing these fragments with *electron microprobes*, scientists recently determined that a massive wave of tens of thousands of asteroids bombarded the Earth, the Moon, and Mars for a brief period of time about 3.9 billion years ago. This, they speculate, may have been caused by the movement of some of the larger planets in our solar system, destabilizing the main asteroid belt between Mars and Jupiter.

The earliest known evidence for life on Earth appears quite soon after this bombardment, in 3.85 billion year old sedimentary rocks…suggesting that the seeds of life on Earth may not have originated here but were "planted" by these asteroids.

Current Mars Science Laboratory missions, namely the rover *Curiosity,* aim to examine Mars with a variety of sophisticated equipment to determine whether Mars is, or ever was, capable of harboring *microbial* (microbe-sized) life.

Should any microbial life be found, scientists wish to examine it further *in-situ* (on-site), using AFRL space-hardened electron microprobes, to determine whether they originated on Mars or were also "seeds" planted by the asteroid bombardment 3.9 billion years ago.

Students participating as scientists and engineers responsible for supporting the Mars Microbial Asteroid Research Survey (MARS²) Mission will require a colony of long-term living quarters and food on Mars.



Fifth grade students participating in the 2012-13 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

Each school year, the Air Force Association (AFA) awards grants of up to $250 to worthy projects that significantly influence student learning. Handy for helping with Link-Up Day transportation costs. Grant applications (online only, no fax/hardcopy) must be submitted by 17 October 2011.

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

Teacher Training

Mars Missions New Teacher Training will be **18 October 2012 from 8:30 am to 3:30 pm**.

Returning Teacher Training will be **30 October from 1:00 pm to 3:00 pm.***

*** Note: Returning Teacher Training originally scheduled for 17 October has been rescheduled to 30 October.**

DoD STARBASE Flight

for fifth graders

Engineering Egg-cellence

Day 1 of the DoD STARBASE Flight is an engineering design egg-stravaganza. Fifth grade student teams use an engineering design process to design a safety restraint device to protect brave shuttle pilot Eggbert as he crash-lands his space shuttle. The design must meet budget, mass, and size constraints, and the whole team has to agree to the design and materials chosen.

Engineering design comes up again when students use 3-D modeling software to design a lab module for a space station. Along the way, they learn and use concepts such as *horizontal, vertical, perpendicular,* and *aligned.*

Finally, students take on a Metric Mission, using rulers, scales, and graduated cylinders to measure length, weight (mass), and volume using the metric system.

STARBASE 2.0 Starts

Following an Open House and a Mentor Meeting, the DoD STARBASE 2.0 program, which will eventually have students building big rockets for the Team America Rocketry Challenge, started on 11 September 2012.

Instructor Ms. Claranita Williams led the Wilson Middle School students through some team-building exercises involving information housed in balloons, followed by the design and construction of a small bottle rocket. With help from mentor Lt Kunbi Adewunmi, students designed a nose cone and fins, and attached them to a small plastic bottle, to create a bottle rocket.

Van Buren Middle School also got in on the act on 19 September 2012. Great to see you again, Van Buren!

VAN BUREN Middle School

TECH Flight for middle schoolers

Technology and Engineering Challenges Flight

Rocket and Team Building

TECH Flight students did some rocket building and some team building during their Day 1 class this semester.

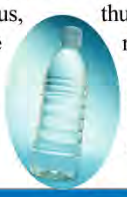
Students worked in teams to construct the *booster* and *payload* sections of the six-foot rockets they'll fly at the Rocket Launch event. They also built and launched a simulated rocket on *RockSim*.

The TECH Flight students went outside and practiced using their Global Positioning Satellite (GPS) equipment, and came inside to build and launch small rockets at a target after figuring out their ideal launch angle.

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 **23 October 2012** (with a make-up day, if needed, on 24 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.

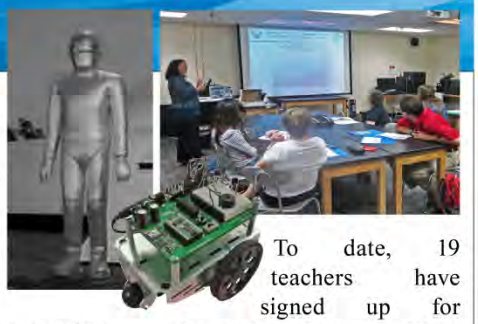
It can be cold, then hot, dusty, and dry out there in the New Mexico desert; there's no running water (although portable bathroom facilities will be available). Small cactus and similar objects can occasionally be found in the area; thus, sandals and flip-flops are *not* recommended footwear.

Bring weather-appropriate layers, bottled water, sunscreen/sun hats—and *lunch*!

Robot Systems Flight

for middle schoolers

Robot Systems Orientation Held



Seven teachers attended the Robot Systems Flight Teacher Orientation meeting held 11 September 2012.

The Robot Systems Flight is a school-based program using project-based learning to teach students programming and robotics. Students program Boe-Bot® robots to maneuver several obstacle courses, and participate in a Robotics Expo event at the end of the Flight to demonstrate what they've accomplished.

Boe-Bot® robots respond to BASIC programming commands to turn, play sounds, and so on. The students won't have to learn a completely alien language like Ms. Helen Benson did in the classic 1951 science fiction movie *The Day the Earth Stood Still*. She famously had to memorize the alien phrase, "*Klaatu barada nikto,*" and repeat it correctly to the giant alien robot Gort, to keep him from destroying the Earth.

At the orientation meeting, Ms. Diane MacAlpine gave an overview of the program and elaborated on concepts such as project-based learning, the commitments AFRL La Luz Academy takes on, and the expectations placed on participating teachers and schools.

To date, 19 teachers have signed up for the Robot Systems Flight this semester, and at least 40 students have taken the pre-test. Ms. MacAlpine is now going around to the various schools and delivering robotics kits. Keep an eye out for yours!

STEM Challenge Flight

for high schoolers

The Kick is Up...And It's Good!

The STEM Challenge Flight, where teams of three or four high school students carry out a real-world STEM project using a multi-phase design process, has kicked off!

- 6 September 2012 was the date of the STEM Challenge Flight Coach Orientation meeting.
- On 13 September 2012, there was a STEM Challenge Flight Mentor Meeting.
- And, on 18 September 2012, the STEM Challenge Flight Kickoff Briefing took place.

We have 9 coaches ant 15 mentors signed up so far, and 42 students came to the Kickoff Briefing. Participating organizations this year include:

- Amy Biehl Charter School
- Ask Academy
- Carlsbad High School
- Hot Springs High School
- Mescalero High School
- Rio Grande Enrichment Center,
- and Ruidoso High School.

After getting an overview of the STEM Challenge Flight assignment and constraints for the year, involving using an engineering design process to make a device that safely launches an egg remotely through a hoop and onto a target, students got hands-on practice with the concepts involved in *kinematics* and *projectile motion*: specifically, *initial velocity* and *range*.

Students conducted a lab where they shot projectiles, collected data, and made predictions about the range of the projectile for a specific angle. They even used a *PlumbBob* (no relation to Spongebob Squarepants).

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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

MARS: Microbial Asteroid Research Survey

MM: Mars Missions

PRS: Phillips Research Site

PWN: Pinpoint WeatherNet

RS: Robot Systems

STEM: Science, Technology, Engineering, and Math

TECH: Technology and Engineering Challenges

T²: Technology Transfer

TTE: Technology Transfer for Education

USAF: United States Air Force

Name That Asteroid!

Q: What do you call a blindfolded dinosaur?

A: *Do-you-think-he-saurus.*

Q: What do you call a blindfolded dinosaur's *dog*?

A: *Do-you-think-he-saurus Rex.*

Q: What do you call the name of NASA's very first planned sample-return mission to an asteroid, scheduled to launch in 2016?

A: *Origins Spectral Interpretation/Resource Identification Security Regolith Explorer (OSIRIS-REx).*

Q: What's the formal name of the asteroid the OSIRIS-REx mission is going to visit?

A: *(101955) 1999 RQ36.* (Ugh! What kind of a name is *that*?!)

Q: What's the *informal* name of the asteroid the OSIRIS-REx mission is going to visit?

A: Well, actually...that's up to *you*.

That's right! NASA has announced a contest, open to students under 18 years old, from anywhere in the world, to name the asteroid that OSIRIS-REx visits.

Each contestant can submit one name. Proposed names must be:

- Preferably one word;
- No more than 16 characters long (including spaces and punctuation);
- Pronounceable (in some language);
- Written using Latin characters such as the English alphabet characters you are now reading (*transliterations* of names from languages *not* written using Latin characters are acceptable);
- Non-offensive;
- Not identical with, or even too similar to, an existing name of a minor planet or natural planetary satellite.

Entries must include a short explanation and rationale for *why* you chose this name.

Contest deadline is Sunday, 2 December 2012.

A panel will review proposed asteroid names. First prize will be awarded to the student who recommends a name that is approved by the *International Astronomical Union Committee for Small-Body Nomenclature.* (Sorry, no word yet on a contest to come up with a better name for *that.* I guess "The International Committee for Naming, Like, Asteroids and Stuff" was already taken.)

Asteroid *(101955) 1999 RQ36*, which is about 500 meters wide, was discovered in 1999 by the Lincoln Near-Earth Asteroid Research (LINEAR) survey at MIT's Lincoln Laboratory. It got its formal name of *(101955) 1999 RQ36* from the Minor Planet Center, a center operated by the Smithsonian Astrophysical Observatory in Cambridge, Mass which assigns inital alphanumeric names to newly-discovered asteroids.

They have quite a system for doing this, too. See, once an asteroid's orbit is known, it gets issued a number. This particular asteroid, *(101955) 1999 RQ36,* happened to be the 101,955th asteroid to get a number, so that's where the "101955" comes from. It was discovered in the year 1999, so that's where the "1999" comes from.

The"RQ36" is a little more complicated. The first letter, "R," refers to the *half-month* it was discovered in: The first half of January would be "A," the second half of January would be "B," the first half of February woud be "C," and so on. This particular asteroid was discovered in the first half of September, so it got an "R."

And the "Q36?" Well, "Q" refers to the number 16, because "Q" is the 16th letter of the alphabet. The "36" is a number that you multiply by 25 (because there's 25 other letters in the alphabet *besides* "Q") to get 900.

900 + 16 = 916. This asteroid was the 916th space object observed in the first half of September, 1999.

So *that's* why its formal name is *(101955) 1999 RQ36.*

As you can see, a *lot* of asteroids get assigned one of these elaborate, convoluted numbers. However, only about 5% of them ever get cool, *informal* names. So being the person who wins this contest and gives this asteroid an informal name would be quite an honor!

Scientists hope that samples returned from Asteroid Ol'-What's-His-Name could provide clues as to the origin of the solar system and the organic molecules that could potentially have seeded life on Earth...*and Mars* (sound familiar? Check out this year's Mars Mission on page 2).

Following the OSIRIX-REx mission, NASA wants to send a *manned* mission to an asteroid by 2025. After that...well, that's when they want to do the first-ever, real-life, *manned mission to Mars!*

"Asteroids are just cool, and *(101955) 1999 RQ36* deserves a cool name!" said Bill Nye, the Science Guy (and CEO of The Planetery Society). "Engaging kids around the world in a naming contest will get them tuned in to asteroids and asteroid science."

For more information, visit www.planetary.org/get-involved/contests/osirisrex/.

Coming Next Issue...

- Teachers Trained for Mars
- Days 2 and 3 of the DoD STARBASE Flight
- Blast Off!

Watch for it!