NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
ASTROGRAM
Newsletter of NASA Ames Research Center, Moffett Field, California

Summer 2011 - A Quarterly Publication

Lift off! Space shuttle Atlantis soars into history

Space shuttle Commander Chris Ferguson and his three crewmates went to the International Space Station after launching from NASA's Kennedy Space Center on Friday, July 8, 2011 on the final mission of NASA's space shuttle program.

"With today's final launch of the space shuttle we turn the page on a remarkable period in America's history in space, while beginning the next chapter in our nation's extraordinary story of exploration," NASA Administrator Charles Bolden said. "Tomorrow's destinations will inspire new generations of explorers, and the shuttle pioneers have made the next chapter of human spaceflight possible."

The STS-135 crew consisted of Ferguson, Pilot Doug Hurley, Mission Specialists Sandy Magnus and Rex Walheim. They delivered the Raffaello multi-purpose logistics module filled with more than 8,000 pounds of supplies and spare parts to sustain space station operations after the shuttles are retired.

"The shuttle's always going to be a reflection to what a great nation can do when it dares to be bold and commits to follow through," Ferguson said shortly before liftoff. "We're not ending the journey today, we're completing a chapter of a journey that will never end."

NASA Ames sent a variety of life science experiments and technology demonstrations aboard the final space shuttle to better our understanding of how robots can help humans live and work in space and how spaceflight affects the human body, the growth of cells, yeast and plants. Future astronauts on long-term space missions in low-Earth orbit, to asteroids, other planets and beyond will rely on robots and need to understand how to prevent illnesses during space travel.

STS-135 was the 135th shuttle flight, the 33rd flight for Atlantis and the 37th shuttle mission dedicated to station assembly and maintenance.

Space shuttle Atllantis completed its 12-day mission and landed safely on July 21, 2011 at NASA's Kennedy Space Center in Florida.

NASA photo by Dick Clark

This image, taken through the window of a Shuttle Training Aircraft, shows the final liftoff of space shuttle Atlantis as it ascended from Launch Pad 39A at Kennedy Space Center on the STS-135 mission, Friday, July 8, 2011. This was the final flight of the Space Shuttle Program, during which the STS-135 crew delivered the Raffaello multipurpose logistics module containing supplies and spare parts for the International Space Station.

A personal perspective: Watching the launch

BY CATHY WESELBY

I had the opportunity to see my first (and the last) space shuttle launch in person at the Kennedy Space Center last month. The opportunity came up suddenly, but I was delighted to go and support public affairs activities for Ames.

On Wednesday, July 6, I drove from Orlando to the Kennedy Space Center, and any jet lag that I felt from the night before was immediately replaced with a surge of excitement when I saw the "Two Days Until Launch" sign. Television news satellite trucks were parked everywhere and the press center was teeming with reporters.

We watched Space Shuttle Weather Officer Kathy Winters say during a pre-launch news conference that there was only a 30 percent possibility STS-135 would launch on Friday. I tried to stay optimistic.

Meanwhile, the center was abuzz with activity. Sesame Street star Elmo made an appearance at the STS-135 Tweetup, much to the delight of the space "tweeps." Elmo asked NASA astronauts Mike Massimino and Doug Wheelock questions about space travel. The beloved mascot for the Solar Dynamics Observatory, Camilla SDO, was also seen rubbing shoulders with Elmo.

The weather did not look promising one day before the launch. A heavy rain and thunderstorm hit the center around lunchtime and lightning stuck within a third of a mile from Launch Pad 39A. Technicians inspected the area for damage before the Rotating Service Structure could be rolled back from the shuttle as scheduled. At the end of Thursday, the weather forecast was still 30 percent for launch the next morning, but the forecast for filling the fuel tanks in the middle of the night was an 80 percent "go."

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NASA Ames' legacy and its contributions to the Return to Flight

by Jack Boyd and Glenn Bugos

The organizational culture and technical competence of NASA Ames remain, today, strongly influenced by its origins as a laboratory of the National Advisory Committee for Aeronautics (NACA). Most simply, that means many people at NASA Ames focus on fundamental research, experimental validation, and nurturing disciplines needed for space exploration.

This NACA influence also manifests itself in some notable organizational tendencies: an active interest in building partnerships, pride in being able to listen and define a problem, a belief in the value of intense peer review, a willingness to create standards, a distaste for theorizing without suggesting proof and, perhaps to its detriment, a lack of experience in large space project work. The NACA was at heart a way for engineers to reach some certainty that innovation would actually work.

Likewise, the work Ames people did to make and keep the STS successful, also has its origins in the NACA, and in the legendary engineering genius of H. Julian "Harvey" Allen. In 1952, well before rockets had enough thrust to launch a payload into outer space, Allen set about figuring out how to return them safely to Earth. The problem of re-entry heating then was well anticipated, though each of the American military services had failed to solve the problem of warhead design by using denser metals in more sharply pointed cones. Allen made the atmosphere work for him, and advocated a blunt-body concept that has since defined the shape of all re-entry vehicles.

Ames Legacy in Hypersonics and Aerothermodynamics

Allen, and his colleagues in the Ames High Speed Research Division, then expanded his theoretical insights into bluntness on ballistic vehicles to bluntness on lift-glide vehicles. They calculated the possible trajectories and performance advantages of lift-glide vehicles. And with their growing knowledge of hypersonic aerodynamics and experience with the X-15, they designed the M-2 as a prototype lifting body.

Following successful glide tests of the lifting body prototypes in the mid-1960s, NASA embarked on a program to use the lift-glide shape as the key design feature of its reusable Space Transportation System.

Perhaps more important than their basic work on the aerodynamic shape and thermal expectations of a lifting body, Allen and his Ames colleagues—notably Alfred Eggers and Clarence Syvertson-- pioneered new experimental tools in aerothermodynamics. These brought experimental proof to the design of space capsules, and helped assure the safe return of astronauts to Earth.

Beginning in the early 1950s, they created a series of ballistic ranges, culminating in the Hypervelocity Free-Flight Facility that created re-entry speeds and validated damping characteristics. They created a series of higher speed wind tunnels, culminating in the 3.5-foot hypersonic wind tunnel, that allowed them test larger models for longer times at speeds up to Mach 7. And they created a series of arc jets, culminating in the 60 MW interaction heating facility, that allowed them to test large samples of thermal protection materials at sustained high temperatures.

Well before spacecraft actually ventured into outer space, Ames had modeled the re-entry challenges in Earth-bound facilities. Ames developed all this theoretical and experimental expertise during its days as a NACA laboratory, expanded it quickly, during NASA's Apollo era, then extended these capabilities to help in the development of the space shuttle.

Start of the Space Shuttle Program

Following the formal launch of the Space Shuttle Program in 1971, NASA Ames people and facilities made many key contributions the shuttle's design. More than half of all wind tunnel testing conducted for the shuttle, totalling 35,000 hours of testing, was done at Ames, using all of Ames' extraordinary collection of wind tunnels.

Half of that testing was done in the 3.5 foot hypersonic wind tunnel, which returned important results on shock-shock interactions within the stack configuration, the effects of split body flaps, and turbulent flows. In the larger wind tunnels, Ames tested the Boeing 747 ferry configuration, as well as the effectiveness of control surfaces at slower landing speeds.

After the first flight of the shuttle, NASA continued to rely on Ames' expertise to evaluate and hone the shuttle. NASA's Numerical Aerodynamic Simulation facility opened in 1985, bringing together all of Ames' expertise in computational fluid dynamics. The NAS very early began modeling the complex aerodynamics of the shuttle ascent stack. Ames human factors specialists modeled cockpit concepts in the Ames flight simulators, and then built the Vertical Motion Simulator to test their ideas about how such a vehicle could be landed.

Perhaps the most important and persistent contribution of Ames to the shuttle program was the development of its reusable Thermal Protection System (TPS). In the early 1970s, Ames worked with Johnson Space Center to develop many candidates of TPS materials—including the baseline LI-900 tile system--and tested them to understand how to improve future generations of tiles.

In 1975, Ames scientists invented the black borosilicate glass coating called Reaction Cured Glass that now covers two-thirds of the orbiter's surface. They also invented a ceramic cloth to solve a difficult problem by filling the gaps between the tiles. Ames continued to conduct thermal protection research, increasingly to provide data to the shuttle program office.

The Operational Space Shuttle

In the 1980s and 1990s, Ames' support of the shuttle shifted. As NASA began to fly science missions aboard the shuttle, Ames life scientists began building experiment packages for its cargo bay. Astronauts continued to train in the Vertical Motion SImulator, but there was less basic research into cockpit design. More of Ames' efforts shifted to supporting design of the Space Station, and technology development for the shuttle diminished. The Ames arc jets remained busy, but there was increasingly less basic research into material design and thermal environments.

The Columbia accident occured, Ames work took another shift. The Columbia Accident Investigation Board used the Investigation Organizer Tool developed at Ames to track the massive amounts of data generated. Tina Panontin, who had earlier worked on the Shuttle Independent Assessment team, advocated use of the tool to determine the cause of the accident.

During the months following the accident, NASA Ames set up a shuttle liaison office, much as it had in the early 1970s, this time led by John Allmen.

Allmen helped JSC and the CAIB find Ames researchers to solve the puzzles identified by the investigation, and also helped Ames see the whole picture of the technical puzzles. Indeed, this is a cultural remnant of its NACA origins still active at Ames—an appreciation for honest peer review, for basic research in supporting technical decisions, for the art of problem definition, and innovation in experimental validation.

NASA Ames Contribution to the Return To Flight

The Columbia Accident Investigation Report made two observations that shaped how NASA Ames would participate in the Return To Flight efforts leading to the launch of STS-114. First, the CAIB noted that the operation programs had generally lost touch with the research work done at the centers, and specifically noted that the shuttle mission team should have contacted Ames experts in thermal protection systems before clearing the Columbia for re-entry. Second, while NASA knew a fair amount about the thermal properties of the shuttle TPS, it knew less about its mechanical properties.

Building upon Ames' long-standing capabilities in computational fluid dynamics, Ames teams developed a model of the aerodynamics around the full ascent stack that was used to understand then modify the external tank. Using a combination of Computational Fluid Dynamics (CFD) and wind tunnel tests, Ames quickly generated loads data on the Protuberance Air Loads (PAL) Ramp prior to its removal.

Stuart Rogers lead a team that developed Debris Transport Analysis (DTA) software and models. Rogers started with an "overflow" code developed at Ames and applied it to the entire flow field. With this model, they showed that shed foam would trim to a high drag configuration, and designed ballistic range tests to prove it. With Ames' supercomputers on standby following the launch of the shuttle, this software allowed shuttle engineers to model what sort of impact damage might be done to the orbiter from debris shed during launch.

One contribution driven by Ames was an effort to correlate arc jet data using CFD and calorimetry. JSC operated its own arc jet, which they used to certify TPS materials for use on the shuttle. The JSC and Ames arc jets environments differed, as did their testing methods, and both differed from the heat environment of actual re-entry. So that both arc jets could be used complementarily to improve TPS materials, or to test scenarios quickly during a shuttle flight, an Ames team led by David Driver developed DPPLR and Laura codes through which arc jet data could be correlated. Ames also developed an optical technique, called laser-induced florescence.

A composite photo of STS-135 taken by Ames' Louise Walker and J.T. Heineck who were funded by the Space Shuttle Program and prepared this image using fusion software to combine six simultaneously captured images they took of STS-135. Five images were taken at a different exposure setting, with a sixth taken in infrared, then all were composited to balance the brightness of the rocket engine output with the regular daylight levels at which the orbiter can be seen. A video version is also available.

As JSC declared interest in new ideas on how to repair the TPS in-space, Ames researchers issued a flood of ideas. James Reuter of Ames led the effort to create an in-flight repair capability. Ames was involved in developing an Orbiter Boom Sensor System (OBSS) to do a final check of the leading edge sensor system prior after separation from the Space Station, but before re-entry to the Earth.

In addition to solving the problems identified by the CAIB, Allmen's group also created a capability to solve unforeseen problems in real time. Ames real-time problem resolution capabilities were all at work with the second shuttle mission post-Columbia (STS-121). The Damage Assessment Team (DAT) used the DPLR code, which worked well because Ames CFD experts were available to help interpret the data. Debris impact models were quickly run and resolved, so the Ames team turned to writing the code needed for a thermal assessment of a gap filler issue. David Driver, who had led Ames efforts to refine the shuttle TPS, documented the thermal analysis program code and monitored the leading-edge sub-system check before shuttle re-entry.

Following the Return to Flight, Ames kept its supercomputing facilities on alert to resolve and problems identified as the shuttles were in orbit.

SOFIA successfully observes challenging Pluto occultation

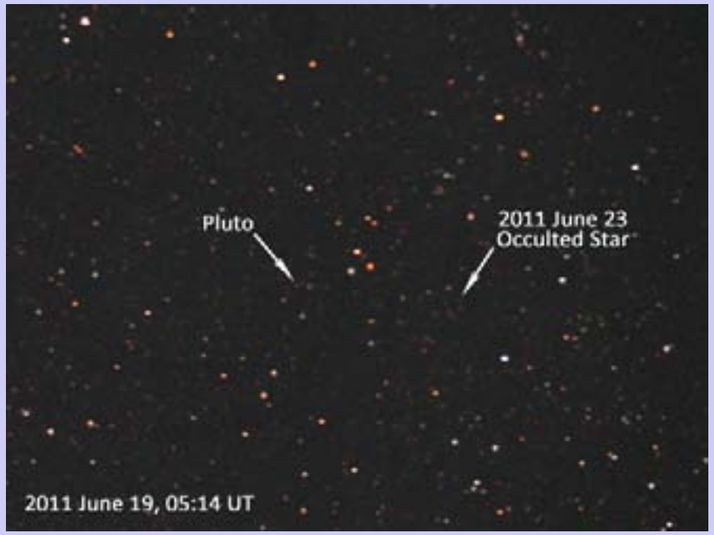
NASA's Stratospheric Observatory for Infrared Astronomy, or SOFIA, demonstrated its unique capabilities recently as the airborne observatory chased down a rare opportunity to view an occultation of Pluto and a distant star. SOFIA was able to fly to the exact location where Pluto's shadow fell on Earth, allowing scientists the opportunity to learn more about the dwarf planet's atmosphere.

SOFIA took off from NASA Dryden's Aircraft Operations Facility, Palmdale, Calif., on the night of June 22, 2011, flying 1,800 miles out over the Pacific Ocean to position itself for the occultation. There were some nail-biting moments during the night, however, because the precise position of Pluto could not be calculated until a couple of hours before the actual event.

Researchers from Lowell Observatory used the telescope at the U.S. Naval Observatory in Flagstaff, Ariz., to take a number of photographs of Pluto and the occulting star. These data were passed to a group of scientists from MIT who calculated precisely where the shadow would fall on Earth. The MIT staff then contacted the SOFIA crew in-flight with news that the center of the shadow would cross 125 miles north of the position on which the airborne observatory's flight plan had been based. After recalculating and filing a revised flight plan, SOFIA's flight crew and science team had to wait an anxious 20 minutes before receiving permission from air traffic control to alter the flight path accordingly.

Ted Dunham of the Lowell Observatory, also in Flagstaff, Ariz., led the team of scientists aboard SOFIA during the Pluto observations. "Because we were able to maneuver SOFIA so close to the center of the occultation we observed an extended, small, but distinct brightening near the middle of the occultation. This change will allow us to probe Pluto's atmosphere at lower altitudes than is usually possible with stellar occultations."

Dunham is the principal investigator for the High-Speed Imaging Photometer for Occultation (HIPO), essentially an extremely fast and accurate electronic light meter. He was a member of the group that originally discovered Pluto's atmosphere by observing a stellar occultation from SOFIA's predecessor, the Kuiper Airborne Observatory, in 1988. Pluto itself was discovered at Lowell Observatory in 1930.



Optical image of the June 23 Pluto occultation star field taken from AAS Press Officer Rick Fienberg's home observatory in New Hampshire.

In addition, a team of German scientists from the German SOFIA Institute at the University of Stuttgart were on board to image Pluto using their newly designed Fast Diagnostic Camera (FDC). On this flight, the FDC served as a photometer to measure the drop in light as Pluto passed in front of the star.

"We have already shown that SOFIA is a first-rank international facility for infrared astronomy research. This successful occultation observation adds substantially to SOFIA's ability to serve the world's scientific community," said Pamela Marcum, SOFIA project scientist.

SOFIA is a joint project of NASA and the German Aerospace Center (DLR), and is based and managed at NASA's Dryden Aircraft Operations Facility in Palmdale, Calif., for NASA's Science Mission Directorate in Washington, D.C. NASA's Ames Research Center in Moffett Field, Calif. manages the SOFIA science and mission operations in cooperation with the Universities Space Research Association headquartered in Columbia, Md., and the German SOFIA Institute (DSI) at the University of Stuttgart.

Ames to host Shuttle Family Reunion

In celebration of all that Ames folks did to boost the shuttle program to such lofty heights, Ames will host a Shuttle Family Reunion on Tuesday, Aug. 9. The event will begin in the Syvertson Auditorium (N201) from 10 a.m. to 11 a.m., with speeches reflecting what Ames contributed and accomplished during the Space Shuttle Program's remarkable 30-year history.

A barbeque sponsored by the Ames Exchange will take place from noon to 2 p.m. in Shenandoah Plaza. More than 700 students interning at Ames will present their posters featuring the work they accomplished this summer.

A personal perspective: Watching the shuttle launch

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On Friday, I was on the road by 4 a.m. from Orlando. I wasn't alone. An estimated crowd of one million people converged on Florida's Space Coast to get a glimpse of the last space shuttle launch.

More than a thousand members of the press were also on site, including high profile journalists such as Geraldo Rivera of FOX News' "Geraldo-At-Large" and John Oliver of Comedy Central's "The Daily Show." Astronauts were milling about and many television journalists were interviewing them about space travel. It was more exciting than being backstage at a rock concert.

The overall mood that morning was optimistic despite the grim weather forecast. I kept one eye on the NASA television broadcast and one eye on the Florida weather radar. A threatening storm system seemed to hover over the Tampa area to the east, staying away from Cape Canaveral.

As the hours and minutes counted down, it looked more and more optimistic that the launch would happen. We ran outside to the area next to the countdown clock and held our breath. At 11:29 a.m. EDT, against the odds, Atlantis soared to the heavens. It was a beautiful sight.

Pilgrims, 2085

BY EVE SUTTON

From Columbus's first voyage across the Atlantic to the settlement of the Pilgrims in Massachusetts was 128 years. So I am guessing that in 2085, 128 years after the launch of the first Sputnik, the private settlement of pilgrims all over the solar system will begin.
-- Freeman Dyson, The Atlantic Monthly, November 1997

We packed everything for a one-way trip. Greenhouse,
deck of cards, extra socks. Belief, and disbelief. Memories:
Earthrise, gossamer, breathless blue and white. Family
photo albums. Our history: relentless, triumphant.
Solar engines. Maps, incomplete, in four dimensions.
Some small but affectionate pets. How lucky we are.

Are we there yet? Confined in all that space. Cameras, diary.
Wine aging variably in the elastic stretch of time.
Plastic tubes of dinner. Simulated gravity. Mount Fuji
in snow, Mount Fuji in summer. Scent of rain-soaked trees.
Radio-wave umbilicus, NASA's fading reassurances.
But oh! The stars unwavering through unatmosphere.

By 2085, if microbes don't starve us of oxygen, we'll settle in
a new New World. Awaiting its discovery, we take
remedies for cabin-fever nerves. Envy the Mayflower's
fresh air, Plymouth's helpful natives. Discarded
refuse floats outside our portals, perfectly preserved.
The black and silent waking sleeping night.

The moon Io erupting. Bright Jupiter in veils of crystalline ammonia ice. Comets, dust belts, planets, their natural and adopted satellites. All beautiful. Celestial real estate is frozen rugged gaseous flaming storm-hidden red as our blood. Praise the Creator of the Infinite Universe. We know there is someplace we can call home.

First published in Montserrat Review, 2001
Broadside Edition in honor of the Space Shuttle Program, 2011

NASA launches new app for Android

BY RACHEL HOOVER

NASA has launched the free NASA App for AndroidTM, a new application designed for mobile devices that run the open source Android platform. The NASA App is available for free on Android MarketTM at: https://market.android.com/details?id=gov.nasa

"The NASA App for iPhone and iPad has been a phenomenal success with more than five million downloads so far," said Jerry Colen, NASA App project managerat at Ames. "Making a version of the NASA App for Android has been the number one request from users. We are delighted to fulfill this request and put NASA's amazing content into the hands of millions of Android users around the world."

The NASA App for Android showcases a huge collection of NASA content, including images, videos on-demand, live streaming video from NASA Television, mission information, feature stories and breaking news. Users also can find sighting opportunities for the International Space Station and track the current positions of spacecraft currently orbiting Earth. App users also easily can share NASA content with their friends and followers on Facebook, Twitter or via e-mail.

For more information about the NASA App for Android, visit: http://www.nasa.gov/nasaapp

The force is strong with NASA's Smartphone-powered satellite

BY RACHEL HOOVER

In 1999, Massachusetts Institute of Technology (MIT) professor David Miller showed the movie, "Star Wars" to his students on their first day of class. Following the scene where Luke Skywalker spars with a floating droid "remote," Miller stood up and pointed: "I want you to build me some of those." So they did. With support from the Department of Defense and NASA, Miller's undergraduates built five volleyball-sized free-flying satellites called Synchronized Position Hold, Engage, Reorient, Experimental Satellites (SPHERES); three of which have been on the International Space Station since 2006.

"I love my job, because I get to use cutting-edge technologies to answer questions like: 'How can robots help humans live and work in space? What will happen when humans explore other worlds with robots by their side? Can we make this happen sooner, rather than later?'" said Terry Fong, director of the Intelligent Robotics Group at NASA Ames.

To begin answering these questions, NASA is equipping the trio of SPHERES on the space station with a Nexus™ S handset made by Samsung Electronics and powered by Google's Android™ platform.

Each SPHERE Satellite is self-contained with power, propulsion, computing and navigation equipment. When Miller's team first designed the SPHERES, all of their potential uses couldn't be imagined up front. So, the team built an "expansion port" into each satellite where additional sensors and appendages, such as cameras and wireless power transfer systems, could be added. This is how the Nexus S handset – the SPHERES' first smartphone upgrade – is going to be attached.

"Because the SPHERES were originally designed for a different purpose, they need some upgrades to become remotely operated robots," said DW Wheeler, lead engineer in the Intelligent Robotics Group at Ames. "By connecting a smartphone, we can immediately make SPHERES more intelligent. With the smartphone, the SPHERES will have a built-in camera to take pictures and video, sensors to help conduct inspections, a powerful computing unit to make calculations, and a Wi-Fi connection that we will use to transfer data in real-time to the space station and mission control."

Nexus S is the first commercial smartphone certified by NASA to fly on the space shuttle and to be cleared for use on the space station. The smartphone includes a four-inch touchscreen display, a 1-GHz processor, digital cameras, gyroscopes, accelerometers, proximity and light sensors, Bluetooth and Wi-Fi networking, as well as 16 gigabytes of internal memory. And, as with an increasing number of smartphones, Nexus S uses the open-source Android platform.

NASA's Smartphone-powered satellite

"Android is a very important feature for our team," said Mark Micire, a software engineer in the Intelligent Robotics Group. "The availability of the Android source code allows us to customize the smartphone to be used as a compact, low-cost, low-power computer, rather than just as a phone. And because the platform is open-source, we anticipate that the public will be able to develop Android software that can be used in our experiments. In the future, you are going see smartphones used for all sorts of embedded processing applications, from robotics to sensor networks and equipment control," Micire said.

Since 2006, astronauts have conducted more than 25 experiments using SPHERES to test techniques to advance automated dockings, satellite servicing, spacecraft assembly and emergency repairs. So far, all the tests have used pre-programmed algorithms to achieve specific flight formations, but now researchers are preparing to control the SPHERES in real-time from ground control stations on Earth and from space.

"Mission control can remotely operate the smartphone-enhanced SPHERES to perform inventory and environmental surveys on the ISS," said Fong. "That way, astronauts can spend more time performing science experiments and other work, instead of routine maintenance. In the long run, free-flying robots like SPHERES could also be used to inspect the exterior of the space station or future deep-space vehicles."

According to Fong, robots like the smartphone-enhanced SPHERES and NASA's Robonaut 2 will provide some of the help of another crewmember; SPHERES' cameras can act as another set of eyes, while the Robotnaut 2 literally adds another set of hands to act as an assistant with small and bulky items alike. An added bonus is that robots do not require any additional life support.

As with the Robonaut 2, all tests thus far have occurred in the safety of the space station's interior. However, in the future, upgraded SPHERES may venture outside the space station as well.

"The space station is just the first step to using remotely controlled robots to support human exploration," said Chris Moore, program executive in the Exploration Systems Mission Directorate at NASA Headquarters in Washington. "Building on our experience in controlling robots on station, one day we'll be able to apply what we've learned and have humans and robots working together everywhere from Earth orbit, to the moon, asteroids, and Mars."

This smartphone-enhanced SPHERES experiment is managed by the Intelligent Robotics Group at Ames with funding from the Enabling Technology Development and Demonstration Program in the Exploration Systems Mission Directorate.

For more information about SPHERES, visit: http://www.nasa.gov/mission_pages/station/science/experiments/SPHERES.html

Auditorium dedicated to Sy Syvertson

NASA photo by Dominic Hart

On July 15, 2011, Ames officially renamed its Main Auditorium (N201) in memory of former Ames Center Director Clarence "Sy" Syvertson.

Syvertson served as Ames Center Director from 1977 to 1984 and passed away Sept. 13, 2010. He began his 35-year career at Ames in 1948 and in addition to being Center Director, he also served as Ames' Director of Astronautics and Deputy Director.

Syvertson was instrumental in remodeling the auditorium and it is entirely fitting that it be named in his honor. A reception followed the dedication in the lobby of Building 200.

Seen here from left to right are: Syvertson's wife JoAnn; Ames Center Director S. Pete Worden; his daughter Lynn, and Jack Boyd, senior advisor to the center director.

NASA unveils wonders of moon to visually impaired

BY CATHY WESELBY

NASA has released a new book for visually impaired people to experience the wonders of the moon.Called "Getting a Feel for Lunar Craters," the 17-page book features Braille and tactile diagrams of the lunar surface, craters and peaks.

The book was created and funded by NASA's Lunar Science Institute (NLSI), at Moffett Field. The author is David Hurd, a space science professor at Edinboro University of Pennsylvania in Edinboro, Pa.

"This book is one giant step for humankind, making lunar science visible through touch and sound," NLSI Director Yvonne Pendleton said. "NASA is committed to the development of resources to bring lunar science into the world of those who cannot see."

To obtain a free copy of "Getting a Feel for Lunar Craters," visit: http://lunarscience.nasa.gov/tactile

2011 Systems Engineering Leadership Development class honored

Twenty systems engineers from across NASA graduated from the Systems Engineering Leadership Development Program (SELDP) in June 2011.

The program's graduation featured presentations by each SELDP participant to the NASA Engineering Management Board, a talk by Orbital Executive President and General Manager for Advanced Program, Dr. Antonio Elias, about the Pegasus rocket systems engineering story, and a visit from NASA Administrator Charlie Bolden.

The graduation week marked the culmination of a yearlong program that provided participants with knowledge, skills, and experiences aimed at preparing them for the challenges of systems engineering leadership at NASA. Once participants completed baseline assessments to identify strengths and areas for development, they embarked on a year of learning, developing, and practicing the qualities of a systems engineering leader: creativity, curiosity, self-confidence, persistence, and an understanding of human dynamics.

The core of the SELDP experience was a hands-on developmental assignment at a new center. Participants took on systems engineering roles that expanded their experience base and challenged them to incorporate new knowledge and skills in an unfamiliar organizational setting. Paul De Leon, Ames Aerospace Systems Engineer, was assigned to Johnson Space Center and served as the assistant to the International Space Station Chief Engineer.

"NASA exists to reach new heights and reveal the unknown, so what we do and learn will benefit all mankind," said Chief Engineer Mike Ryschkewitsch to the graduates. "What each of us do, no matter how small, it does make a difference. We are driven by being part of something bigger than ourselves and the opportunity to make a difference."

SELDP grew out of a need identified by NASA leadership and the Office of the Chief Engineer for an Agency-wide leadership development program that would help identify and accelerate the development of high-potential system engineers; with a focus on specific leadership behaviors and technical capabilities that are critical to success in the NASA context. Headed by Christine Williams of the NASA Academy of Program/Project and Engineering Leadership (APPEL), SELDP aims to develop and improve leadership skills and technical capabilities.

NASA Chief Scientist Waleed Abdalati visits Ames

On June 23, 2011, Dr. Waleed Abdalati, NASA's chief scientist, presented an all hands interactive presentation at Ames entitled "Science to Inspire and Science to Serve: A Dialogue with NASA's Chief Scientist." NASA's investments in science began with the agency's inception and have evolved into a complex portfolio spanning multiple disciplines and centers. Abdalati took a look at NASA's past, present and future science portfolio in the context of shifting national and agency priorities. As the administrator's primary advisor on science, and spokesperson for science at NASA, he shares insights and perspective from the vantage point of the agency's top leaders.

NASA photo by Eric James

Third Annual Braxton Open Golf Tornament tees off

The Third Annual Braxton Open Golf Tournament was held June 17 at the Moffett Field Golf Course in recognition of the Juneteenth Celebration. It was sponsored by the the Ames African American Advisory Group.

NASA photos by Dominic Hart

NASA flies greenhouse gas mission over Nevada salt flat

BY RUTH DASSO MARLAIRE

Scientists from NASA Ames joined a multi-institute team of researchers June 17-27, 2011, to investigate carbon dioxide and methane gas emissions from a dry lake bed and neighboring environment in Railroad Valley, Nev.

The Railroad Valley Vicarious Calibration Campaign, a collaboration between the Japan Aerospace Exploration Agency (JAXA), and NASA's Jet Propulsion Laboratory (JPL), Pasadena, Calif., is an international, multi-year effort to calibrate space-based observations of carbon dioxide and methane collected by the Japanese Greenhouse Gases Observing Satellite (GOSAT), using ground and airborne data.

The campaign is based at Railroad Valley, on a dry lake bed, or playa, about 75 miles southwest of Ely, Nev. It involves more than 30 scientists and engineers from JAXA, the University of Wisconsin, Madison, Colorado State University, Fort Collins and JPL.

The Ames team supported the effort by providing ground and airborne measurements of carbon dioxide and methane. In addition, for the first time this year, the Ames team also investigated local sources of halophiles organisms that live in evaporated ponds where there are extreme concentrations of salts.

"We are pleased to offer these observations to our Japanese and Jet Propulsion Laboratory colleagues in support of the important task of very precisely measuring greenhouse gases from space. We look forward to continuing to support the GOSAT team and the upcoming NASA Orbiting Carbon Observatory -2 (OCO-2) mission," said Laura Iraci, an Earth science researcher from the Atmospheric Science Branch at Ames who planned and implemented the Ames effort.

During the campaign, the Ames team conducted a series of flights with an unmanned aircraft system (UAS), a modified Alpha Jet and a NASA ER-2 Earth resources aircraft, outfitted with AVIRIS, MASTER, and S-HIS instruments. NASA's ER-2 high-altitude aircraft flew over Railroad Valley carrying MASTER, AVIRIS and a digital camera system at an altitude of 65,000 feet complementing data collected by the other two aircraft at lower altitudes.

The UAS, known as the Sensor Integrated Environmental Remote Research Aircraft (SIERRA), carried sensors to measure greenhouse gases and winds and flew at altitudes of 100-2,500 feet above ground. The SIERRA flew two measurement missions: one to determine vertical profiles of carbon dioxide over the base camp on the playa, and measurements across the playa at low altitudes, and the second to map sources of natural and biogenic methane. SIERRA, which is operated out of Ames, flew from a public airstrip at Currant Ranch, Nev.

The second aircraft, an Alpha Jet, owned and operated by H211, LLC, flew to the Railroad Valley site from Ames and made a downward spiral around the base camp site. The spiral had a top altitude of approximately 25,000 feet, a bottom altitude near 5,000 feet, and an approximate three mile radius. The vertical profile took approximately 20 minutes to complete.

Ground observations showed what appeared to be bursts of carbon dioxide and methane from the soil of the salty lakebed. Preliminary tests suggest a possible surface, or subsurface, source for these gas emissions. These findings are important to both Earth and planetary scientists: greenhouse gases contribute to global warming, and recent scientific findings of Mars' surface suggest evidence that there were large bodies of salt water in the past. Both perspectives emphasize a need to further investigate these types of environments for past and present life. For example, methane has been reported in the atmosphere of Mars, and is known to be produced by microbial mats that are present in the most salty environments on Earth.

To study the source of gas emissions, Chris McKay and Brad Bebout, space science researchers from Ames, led a team to observe biogenic and non-biogenic sources of methane in the Railroad Valley area. Using data loggers inserted near the surface and at depths of 20 and 30 cm to monitor the temperature and moisture of the soil, the space team collected soil and gas samples for further study in the laboratory. In addition, the SIERRA flew over potential methane sources on June 18 and 21, while the ground-based team collected concurrently carbon dioxide observations on the ground June 21.

"Although there is a general understanding of the natural and anthropogenic sources and sinks of carbon dioxide and methane, their fluctuations must be better quantified to better forecast and mitigate global climate change. These measurements over the dry, salt flat will help us better measure the spatial distribution and heterogeneity of greenhouse gases," said Bebout.

This work also is important to NASA's goals in Astrobiology. Methane has been reported on Mars and pinpointing sources and determining whether or not the methane is biogenic will also be important there.

According to Bebout: "We can use Railroad Valley and other Mars analogue sites to help interpret methane data to be returned from upcoming Mars missions, including Mars Science Laboratory and the 2016 ExoMars Trace Gas Orbiter."

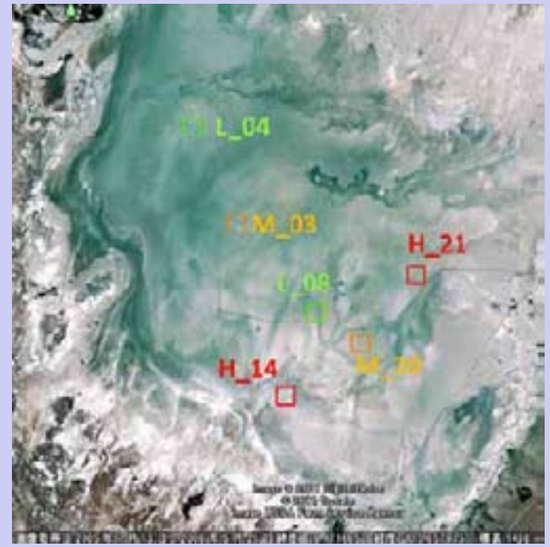

photo by Google

NASA Ames scientists investigated carbon dioxide and methane emissions from various sites on a dry lake bed in Railroad Valley, Nev.

NASA provides golden opportunity to Greene Scholars

BY RUTH DASSO MARLAIRE

"Do you think you're going to crash? Let's see how it plays out," said Christina Thompson, a volunteer parent for the Greene Scholars Program. Thompson was helping students create Air Traffic Control flight simulations recently at the Exploration Encounter Center at NASA's Ames Research Center, Moffett Field, Calif.

NASA has an education goal to inspire and engage students in science, technology, engineering and math (STEM) content. As part of a never-ending pursuit of this goal, NASA offers education programs throughout the summer to sustain elementary students' interest in STEM.

The Greene Scholars Program (GSP) has a similar goal. Focused on developing the academic gifts of African American students, its primary goal is to increase the success rates of their students in STEM course work and the number of students choosing STEM careers. For the first time, the organizations collaborated and NASA hosted GSP at its newly renovated learning facility this summer.

"We are very pleased to be here at Ames. Our program looks for hands-on math, science and technology experiences for our students," said Gloria Whitaker-Daniels, director of Greene Scholars Program and a retired program engineering manager. "Our program is very successful. All of our students who complete this program go to college and 28 percent pursue STEM studies."

The GSP is closing the achievement gap: Its academic achievement results show that all students who have completed the program pass the California High School Exit Exam (CAHSEE). They also meet the University of California's 'A-G' requirements for college admission, and graduate from high school. These achievements are due in part to the families' participation in the program.

According to Whitaker-Daniels, after students submit an application to attend GSP, their parents are interviewed to assess their technical expertise, including their organizational or hospitality skills. Once a skill is identified, the parent serves on one of 13 committees, and also receives guidance in best practices and strategies for engaging and motivating their children. On average, parents volunteer 50 hours per year, or about four hours per month. Parents are expected to perform specific roles in the organization until their scholar graduates from high school.

NASA photo: by Eric James

NASA hosted the Greene Scholar Program for the first time this summer at the Exploration Encounter Center, a supersonic wind tunnel converted into a learning facility.

"We know our children are capable given the right resources," said Whitaker-Daniels."I have three children who have gone through the program; one daughter graduated with a degree in neuroscience, my second daughter is studying biomedical engineering, and my son is a senior in high school."

In addition to the academic requirements, the program seeks opportunities that provide hands-on experiences, strengthens problem-solving skills, builds self-esteem and stimulates intellectual curiosity. NASA's commitment to education, with its dedicated STEM education resource facilities, provides a golden opportunity for the program to fulfill its charter.

Throughout the week, students explored the various activities at NASA Ames Exploration Encounter Center, a supersonic wind tunnel that was converted into an education facility. Its many hand-on activities make math and science curriculum come alive for students who experience science in action and see how it relates to their lives.

Within the education facility, STEM subjects are divided into four hands-on stations: physics, flight, space and Earth. Each station has three physical activities. For example, the physics station demonstrates physics concepts, one of which is the gyro chair, where students learn how a gyroscope works.

"I liked the gyro chair the best. It's cool how you hold a wheel, and it makes the chair spin in the same direction. The force of the wheel makes the chair move," said Yazmeen Norwood, a student at John Sinnott Elementary School, Milpitas, Calif.

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Ames honors Nobel Prize Winner Baruch Blumberg

Ames employees celebrated the life of Dr. Baruch "Barry" Blumberg during a tribute and reception held June 21, 2011, in the Ames Exploration Center.

Blumberg was the first director of the NASA Astrobiology Institute, a Distinguished Scientist of the NASA Lunar Science Institute and winner of the 1976 Nobel Prize in Medicine for identifying the Hepatitis B virus and making "discoveries concerning new mechanisms for the origin and dissemination of infectious diseases."

Blumberg passed away April 5, 2011, while visiting Ames as a featured speaker at the International Lunar Research Park Exploratory Workshop. He was 85.

Ames employees participated in an afternoon of remembrances and fellowship with Blumberg's family, friends and colleagues to honor the legacy of a great man and our treasured friend.

NASA photo Dominic Hart

From left to right, at the Ames tribute to Baruch "Barry" Blumberg, Barry's son, Noah Blumberg, Barry's wife, Jean, and their daughter, Anne Blumberg. Noah and Anne are two of Barry's four children.

NASA provides golden opportunity to Greene Scholars students

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The flight station also teaches various science and math fundamentals. The principles of flight are illustrated using a small, mock-up wind tunnel, and the computer program, Air Traffic Control Smart Skies, allows students to become air traffic controllers by creating their own scenarios, based on mathematic principles, and watching the simulation play out. Students are taught the four forces of an airplane: weight, lift, thrust and drag.

"I heard people talk about air traffic control, but I had no idea what that meant. I thought a pilot just got into a plane and flew off. Playing the air traffic control simulation, put things in perspective. They tell pilots when they can take off and land and how high to fly," said Norwood. She was one of many students who used math to solving problems.

"Now, try to remember what an air traffic controller does," said Thompson. "I can guarantee you would lose your job (as an air traffic controller) using that nautical speed. Look at how many planes are in the air. What is going to happen?"

The Greene Scholars Program will celebrate its 10th anniversary in January. It was founded in 2002 by Debra Watkins, former president of the Santa Clara County Alliance of Black Educators, to help youth of African ancestry successfully complete higher STEM education and serve as positive role models and contributors to their communities. The program is named after Frank S. Greene Jr., a pioneering scientist who was one of the Bay Area's first African American venture capitalists. As a long-term K-12 initiative, the Greene Scholars Program is designed to provide 21st century leaders with strong science/mathematics backgrounds coupled with innovation, entrepreneurial/leadership and problem solving skills.

"NASA Ames continues to support the nation's education programs and educators by providing high quality programs, resources and facilities that are helping build the workforce of tomorrow," said James Busby, acting education director at Ames.

For more information about the Greene Scholars Program, see:
http://www.greenescholars.org/

Ombuds Office services available to Ames personnel

By Jack Boyd

The Ames Ombuds Office provides all civil servants, contractors and students at the center with a supplemental, confidential, and informal channel of communication to raise significant issues and concerns that they perceive could impact safety, organizational performance or mission success.

The Ombuds is accountable for conducting informal inquiries, raising issues of concern to appropriate officials and redirecting matters not under the Ombuds' realm to the appropriate office or organization with an existing administrative system, for example, the Inspector General, the Office of Equal Opportunity and Diversity, Ames Federal Employees Union, Procurement Ombuds, Chief Counsel and Human Resources.

The Ombuds' power rests on their reputation for confidentiality, fairness, objectivity, tact and respectful concern for the welfare of all individuals of the NASA community and for the well-being of the agency.

John W. Boyd continues to serve as Ames Ombuds. Geoffrey Briggs is retiring from his position as the alternate Ames Ombuds and will be replaced by James Arnold.

Arnold serves as Ames alternate Ombuds. His association with NASA spans five decades, split evenly between research and management roles. His technical experience is in aerothermodynamics, computational chemistry, thermal protection systems, arcjet testing, advanced life support and nanotechnology. Arnold retired as Chief of the Space Technology Division in 2002, and is currently conducting research for the Entry Systems and Technology Division.

The Ombuds office is located in Building 241, Room 137, Mail Stop 200-1A. John W. Boyd can be reached at (650) 604-5222 or john.w.Boyd@nasa.gov, and Jim Arnold can be reached at (650) 604-5265 or james.o.arnold@nasa.gov .

The Ombuds website is http://insideames.arc.nasa.gov/life-ombudsoffice.php

John Boyd, Ames Ombuds

James Arnold, Alternate Ames Ombuds

Scientist honored for excellence in cryogenic research

Jeffrey R. Feller of Ames recently received the Cryogenic Society of America's Award for Excellence in Cryogenic Research at the Cryogenic Engineering Conference in Spokane, WA.

Feller (center) of Ames is shown receiving the CSA Award for Excellence in Cryogenic Research from Awards Committee Chair John Pfotenhauer (right) and CSA Executive Director Laurie Huget (left).

The award and honorarium are presented by the society for "research contributions in a particular area leading to a major scientific advance in the cryogenic field." The nomination letters noted Feller's significant contributions in the field of active cooling for cryogenic propellants, and his leadership in the field of zero boil off storage of hydrogen in space.

The award is unique, since the nomination and requisite two letters of support must come from individuals outside of the nominee's institution. Feller's nomination was submitted by the NASA's Glenn Research Center and letters of support were received from both the NASA's Kennedy Space Center and NASA's Marshall Space Flight Center.

Ames Ongoing Monthly Events Calendar

African American Advisory Group (AAAG) Mtg., every last Tuesday of each month, 12 - 1 p.m., Bldg. N241, Rm 237. POC: Chair - Jim Busby, ext. 4-2792.

Ames Amateur Radio Club, third Thurs., of ea. month, 12 noon, N-T28 (across from N-255). POC: Michael Wright, KG6BFK, at ext. 4-6262.

Ames Ballroom Dance Club, Classes on Tuesdays. Beginning classes meet at 5:15 p.m. Higher-level class meets at 5:50 p.m. Held in Bldg. 944, the Rec. Center. POC: Helen Hwang at helen.hwang@nasa.gov, ext. 4-1368.

Ames Bicycling Club, every third Wednesday of each month, 12 noon - 1 p.m., Bldg. N-245 Auditorium. For information on the club go to the website https://ames.clubexpress.com. POC: Julie Nottage at jnottage@mail.arc.nasa.gov, ext. 4-3711.

Ames Bowling League, Homestead Lanes Thursdays at 6:20 p.m. Need substitute bowlers. Sign up questions: Steve Howard at ext. 4-4884.

Ames Child Care Center Board of Directors Mtg., every other Monday, 1 - 2:30 p.m., Bldg. N-262/Rm 180. POC: Sally Miller, ext. 4-5411.

Ames Contractor Council Mtg., first Weds. of ea. month, 11 a.m., Bldg. N-200, Committee Room. POC: Elisa Taube (408) 541-2838.

Ames Federal Employees Union (AFEU) Mtg, third Wednesday ea. month, noon. Bldg. N-247, Rm. 109.. Guests welcome. Info at: http://www.afeu.org. POC: Paul K. Davis, ext. 4-5916.

The Hispanic Advisory Committee for Excellence (HACE) Mtg., first Thursday of each month, 11:45 a.m. - 12:45 p.m., Bldg. N-255, Rm. 101C. POC: Eric Kristich, ext. 4-5137 and Mark Leon, ext. 4-6498.
Jetstream Toastmasters, Mondays, 12 p.m. - 1 p.m., Bldg. N-269/Rm.179. POC: Tim Steiger, ext. 4-0195, tim.steiger@nasa.gov. Web: http://jetstream.freetoasthost.com

Ames Mac Support Group Mtg., third Tuesday of each month, 11:30 a.m.to 1 p.m., Bldg. N-262, Rm 180. POC: Tony ext. 4-0340.

Ames Model Aircraft Club, flying radio-controlled aircraft at the north end of Parsons Ave. on weekend mornings. POC: Mark Sumich, ext. 4-6193.

Moffett Aikido Club, Monday and Wednesday evenings, 6:30 p.m., Bldg. 944, across from former McDonalds. Aikido is a non-competitive, defensive martial art known as the "Way of Harmony." POC: Diane Pereda (650) 575-9070 or Robert Dean (650) 787-1007, email: mfaikido@aol.com

Native American Advisory Committee Mtg., fourth Tuesday each month, 12 noon - 1 p.m., Bldg. 19, Rm 1096. POC: Mike Liu, ext. 4-1132.

Ames Nimble Knitters Club, every Tuesday at 11:30 a.m., Bldg. N210/Rm 141. POC: Rosalyn Jung, knitfan2@yahoo.com or Diane Alexander at ext. 4-3140. URL: http://knit.arc.nasa.gov

Ames Green Team (formerly the Green Ames Working Group) meetings are held the first Thursday of each month in N237, Room 101, from 1:30-2:30 p.m. For information, call Roger Ashbaugh, Ames Environmental Management Division, ext. 4-5602. http://environmentalmanagement.arc.nasa.gov/reports/eo-13514.html

Ames Sailing Club Mtg., second Thursday of each month (March through November), from 12 p.m. - 1 p.m., Bldg. N-260, Rm. 113. URL: http://sail.arc.nasa.gov/. POC: Clif Horne, ext. 4-4571.

Ames Safety Committee, third Thursday of each month, 10 a.m. - 11 a.m., Bldg. N-237, Rm. 201. POC: John Livacich, jlivacich@mail.arc.nasa.gov, ext. 4-3243 or Terry Reichert, treichert@mail.arc.nasa.gov, ext.-4-0375.

Ames emergency announcements

To hear the centerwide status recording, call (650) 604-9999 for information announcements and emergency instructions for Ames employees. You can also listen to 1700 KHz AM radio for the same information.

Exchange Information

Information about products, services and opportunities provided to the employee and contractor community by the Ames Exchange Council. Visit the web site at: http://exchange.arc.nasa.gov

Beyond Galileo Gift Shop N-235 in the cafeteria , 8 a.m. to 2 p.m., ext. 4-6873

Visitor Center Gift Shop (White Tent N-943-A, Tues-Fri, 10 a.m. to 4 p.m., Sat. - Sun, 12 - 4 p.m., ext. 4--5412
Remember to purchase your baby shower, birthday, holiday gifts at Ames' two gift shops!

Mega Bites Cafeteria N-235, 6 a.m. to 2 p.m., ext. 4-5969/Catering ext. 4-2161

Barcelona Café Bldg. 3, 6:30 a.m. to 2 p.m., ext. 4-4948/Catering ext. 4-4948

See daily menus at: http://exchange.arc.nasa.gov/cafe/menu.html

Moffett Field Golf Club with 'Tee minus 1' Grill and Sports Bar. Catering available. Call (650) 603-8026. Extended Happy Hour Thursdays, $5 and $6 pitchers of beer starting at 4 p.m. to 8:30 p.m.

RV Lots Available Call to reserve a space at (650) 603-7100/01.
Civilian/Contractors, $50/mo; military $25/mo

NASA Lodge (N-19) 603-7100

Where to stay when you're too tired to drive home? What about the lodge?! Two types of rooms: Bldg. 19 (43 rooms), rate: $55/night ($5 ea add'l adult); Bldg. 583 (150 rooms), rate: $45/night ($5 ea. add'l adult)

Ames Swim Center (N-109) 603-8025

Closed for repairs, for updates visit http://amesexchange.arc.nasa.gov/swim/index.html
The pool is heated year round! The pool is currently available for lap swim, pool parties and special events. POC: Ryan Storms, Pool Manager (650) 603-8025. Memberships: single memberships: $60/yr. Family memberships: $80/yr. After purchasing a membership, there is an entrance fee: daily entrance fee - $3/day or lap pass fee - $50 for 20 uses. Platinum membership - $380/yr. (no daily fee). Special events: include military training, swim team events, kayak role practice, etc. The cost for special events is $75/hr, or $50/hr for military.

Reservations for Chase Park call ext. 4-4948
Reservations for ARC Park call ext. 4-5969

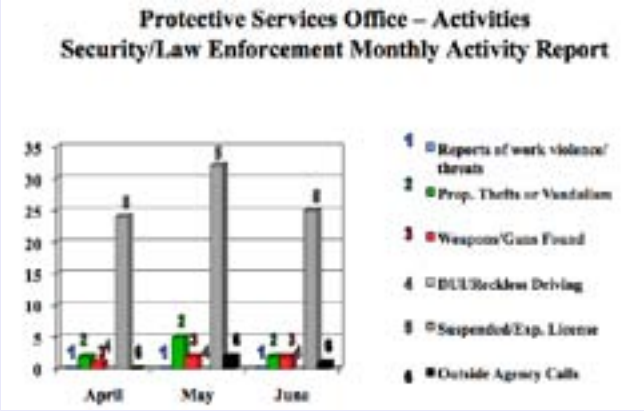
Ames Cat Network

The Ames Cat Network needs help finding homes for cats trapped at Moffett. They range from feral to abandoned/lost pets. Tested, altered and inoculated. Call Iris at ext. 4-5824 if you or someone you know are interested in fostering or adopting a cat.

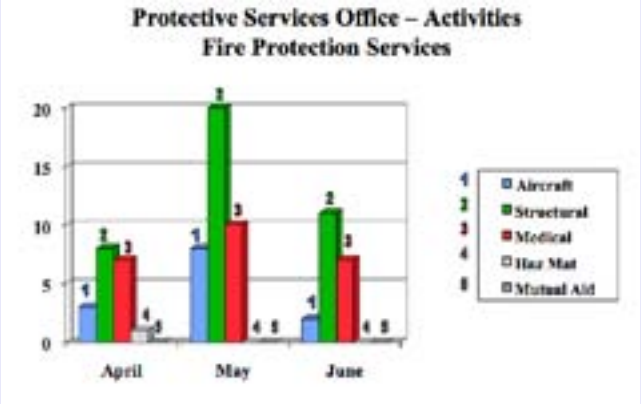
Protective Services monthly activity

A statistical summary of activities of the Protective Services Division's Security/Law Enforcement and Fire Protection Services units for the month of June 2011 is shown below.

Security/Law Enforcement Activity



Fire Protection Activity



NASA honors lunar scientist for research contributions

BY CATHY WESELBY

G. Jeffrey Taylor received the Shoemaker Distinguished Lunar Scientist Award during a ceremony at the Lunar Science Forum on July 19, 2011 at NASA Ames. The award is given annually to a scientist who has significantly contributed to the field of lunar science.

Taylor, a planetary science faculty member at the University of Hawaii, Honolulu, specializes in planetary volcanology, igneous processes and extraterrestrial materials. He uses a combination of petrology, geochemistry, field observations and remote sensing and theory to address problems in planetary science. Taylor was also awarded the Carl Sagan Medal for Excellence in Public Communication in Planetary Science in 2008. He received his PhD in Geology from Rice University.

For more information about the NASA Lunar Science Institute, visit: http://lunarscience.nasa.gov/

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National Aeronautics and Space Administration

Ames Research Center
Moffett Field, CA 94035-1000

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Astrogram NP-2011-08-01-ARC

ASTROGRAM

The Ames Astrogram is an official publication of Ames Research Center, National Aeronautics and Space Administration.

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Editor, Layout and Design.....Astrid Olson

You can reach the Astrogram Office at: astrogram @mail.arc.nasa.gov or by phone at (650) 604-3347. Astrogram Web site: http://www.nasa.gov/ames/astrogram.