

December 2007

2007 Holiday greetings from the Ames center director

BY S. PETE WORDEN

As 2007 draws to a close, it's important to take time to pause and reflect on our numerous accomplishments. We had a great year. We made major contributions in several key areas, including lunar exploration, environment, collaborations and exploration, establishing Ames as a premier research center.

NASA announced this year that the new Lunar Science Institute will be based at Ames, ensuring that our center will play a key role in future exploration as NASA returns to the moon and later travels to Mars. Next year, the Lunar CRater Observation and Sensing Satellite (LCROSS) will slam into the moon and provide scientists with a wealth of data that will tell us a great deal about the lunar surface

and help prepare NASA to put boots on the moon by the end of the next decade.

This year, NASA Ames helped firefighters battle some of the worst wildfires in California's history. NASA flew a remotely piloted aircraft called the Ikhana over devastating wildfires in Southern California, Oregon and near Gilroy. Using its sophisticated imaging technology on board, Ames was able to help firefighters peer through the dense smoke to see how best to combat the fierce flames.

Ames forged key partnerships with some of the best and brightest companies on the planet, including our Silicon Valley neighbors, Google and Microsoft. We are working with Google to develop Google Moon so that everyone can take a virtual trip to the lunar surface. With Microsoft, we are developing an immersive imaging technology that lets people

see NASA in a whole new way.

Next year promises to be even more exciting. NASA will be celebrating its 50th anniversary. In the fall, we're launching LCROSS on its mission to the moon. In 2009, we're looking forward to seeing the Kepler mission begin its search for habitable planets. It's an exciting time to be here at NASA Ames.

So as we say goodbye to 2007 and look forward to 2008, I want to express my sincere thanks to each and every one of you for all your hard work and numerous contributions to the center. I know that with your help, we can make 2008 even better. I wish you and your families happy holidays and best wishes for the new year.

NASA Ames study reveals less water in Mars' clouds

BY JOHN BLUCK

Martian clouds may contain less water than previously thought, according to a new NASA Ames study. New NASA laboratory measure-

"The martian clouds we are studying are composed of water ice, like some clouds on Earth. However, they are forming at very cold temperatures, often below minus 100 degrees Cel-

much harder to initiate cloud formation at these cloud temperatures than what we thought," he explained.

"This difficulty results in larger cloud particles, which fall out of the atmosphere more quickly and, thus, results in less cloud mass and a drier atmosphere," Colaprete explained.

Colaprete presented his findings Dec. 11, 2007, during the annual American Geophysical Union (AGU) fall meeting at San Francisco's Moscone Convention Center.

Previously, scientists believed that martian clouds would form at 100 percent relative humidity, but the new study shows that martian air has to be more supersaturated with water to form clouds than scientists theorized before.

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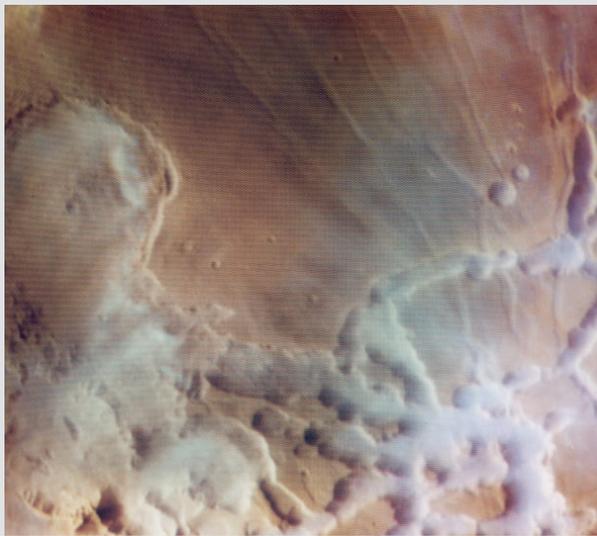
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One place where water can be found on Mars is its colorful clouds. In this photo, taken by Viking Orbiter 1, which visited Mars in 1976, water clouds are visible just after sunrise and around a maze of canyons known as Noctis Labyrinthus. Scientists don't yet know, however, why these clouds formed, and why some stick to the canyons. One possibility is that water sometimes condenses in shaded regions of the canyons, only to evaporate into clouds when exposed to the morning sun. Water in any form on the Mars might be important to sustaining life and possible future human exploration.

Photo: Viking Project, USGS, JPL, NASA

ments of simulated martian clouds reveal that scientists may have been overestimating the amount of water in the planet's atmosphere.

sius (minus 148 degrees Fahrenheit)," said Tony Colaprete, an Ames planetary scientist. "What we have found in our laboratory studies is that it is

Scientists assess possibilities of water and life on Enceladus

BY JOHN BLUCK

There is a chance liquid water may exist on Saturn's moon, Enceladus – and even a possibility that life could be there, too – according to NASA scientists who are studying data from NASA's Cassini spacecraft.

High-resolution Cassini images show icy jets and towering plumes ejecting large quantities of particles very rapidly as seen in images taken by the spacecraft. Scientists have found evidence the jets might be erupting from near-surface pockets of liquid water above 32 degrees Fahrenheit, like cold versions of the Old Faithful geyser in Yellowstone National Park, according to NASA reports.

Scientists are eagerly anticipating the results from a closer Enceladus flyby proposed for an extended Cassini mission, according to Christopher McKay, a scientist at NASA Ames.

"The geysers seem like good evidence for liquid water," McKay observed. "The geysers and the methane in them both seem to up the chances for life. I would say that the chance for life is good enough to warrant further investigation."

Scientists believe the methane could come from three potential sources. Researchers say it could be primordial – very ancient – or it could be manufactured deep within Enceladus, and lastly, and least likely, the methane could be biological in origin.

McKay and Carolyn Porco, Space Science Institute, Boulder, Colo., presided over numerous scientific presentations during a morning session, "Enceladus: Possibilities for Water and

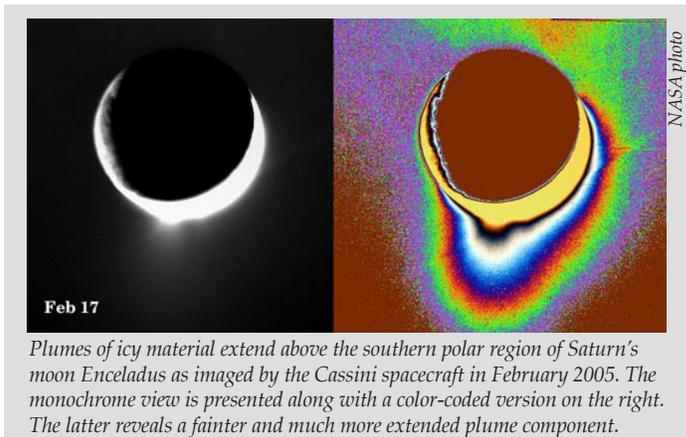
Life," on Dec. 10, 2007, at the Moscone Convention Center South in San Francisco.

Though Saturn's moons are far from the sun, there could be liquid water on Enceladus because the "general thought is that there must be some sort of tidal heating," said McKay.

Some scientists hypothesize that bacteria, living off hydrogen and carbon dioxide, and making methane,

might live on Enceladus. The bacteria would be "similar to subsurface,

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Plumes of icy material extend above the southern polar region of Saturn's moon Enceladus as imaged by the Cassini spacecraft in February 2005. The monochrome view is presented along with a color-coded version on the right. The latter reveals a fainter and much more extended plume component.

Study reveals less water in Mars' clouds

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"We want to understand the climate of Mars and how the martian water cycle operates," Colaprete said. "Clouds are integral to this system, just as on Earth. However, assuming the clouds form or behave the same as on Earth may be a bad assumption."

According to Colaprete, more accurate understanding of the processes that control martian clouds and water cycle are critical to understanding Mars' current and past climates.

A large water ice cap at the martian north pole dominates the martian water cycle. During the northern summer this water ice cap evaporates, and winds carry the resulting water vapor to the south pole, according to Colaprete.

"The amount of water in the martian atmosphere varies greatly in space

and time," Colaprete observed. Clouds in the atmosphere largely control the amount of water that comes off of the north pole and migrates to the south pole.

"Water that reaches the southern winter pole freezes to the surface," Colaprete said. "In the southern spring, this water re-evaporates and returns to the northern polar cap. The cycle is repeated year after year."

If all the water in the atmosphere were to freeze out to the surface, it would make a layer of ice about one-fifth the thickness of a human hair, according to Colaprete.

"Cloud mass is typically only 10 to 20 percent of the total water content. However, the thin martian atmosphere is much more sensitive/reactive to the influence of these clouds," he said.

American Geophysical Union conference held

The annual American Geophysical Union, (AGU) conference took place from Dec. 10 - 14, 2007, at the Moscone Center in San Francisco (right photo). Chris McKay of Ames and Carolyn Porco, Space Science Institute, Boulder, Colo., presided over numerous scientific presentations during a morning session, 'Enceladus: Possibilities for Water and Life.' Ames science writer John Bluck wrote several articles based upon recent discoveries that were the subject of some of the presentations at the conference. The articles, 'NASA Study Reveals Less Water in Mars' Clouds' focuses on recent findings by NASA Ames planetary scientist, Tony Colaprete, who presented his study results on Dec. 11; the article 'NASA Scientists Assess the Possibilities of Water and Life on Enceladus'; and the story, 'NASA Scientists Predict Major Ecosystem Carbon Loss in Western States,' are all included in this issue of the *Astrogram*.



NASA photo by Eric James

Scientists predict major ecosystem carbon loss in western states

BY JOHN BLUCK

Future climate scenarios of air temperature warming imply that ecosystems across the western United States will experience large carbon losses to the atmosphere and tree growth decline in the western United States, according to NASA Earth scientists.

The losses will occur "except in most isolated forest areas of the high mountain zones where the snow packs remain deep," said Christopher Potter, a scientist at NASA Ames.

Ecosystem carbon is the carbon that green plants remove from the atmosphere through photosynthesis, and which plants use to make roots, stems and foliage.

Scientists estimate potential losses of carbon across the western United States during a warmer and drier than average year will range from 10 to 40 grams of carbon per square meter, which may equal 10 percent of the total green plant production annually at many locations, according to Potter.

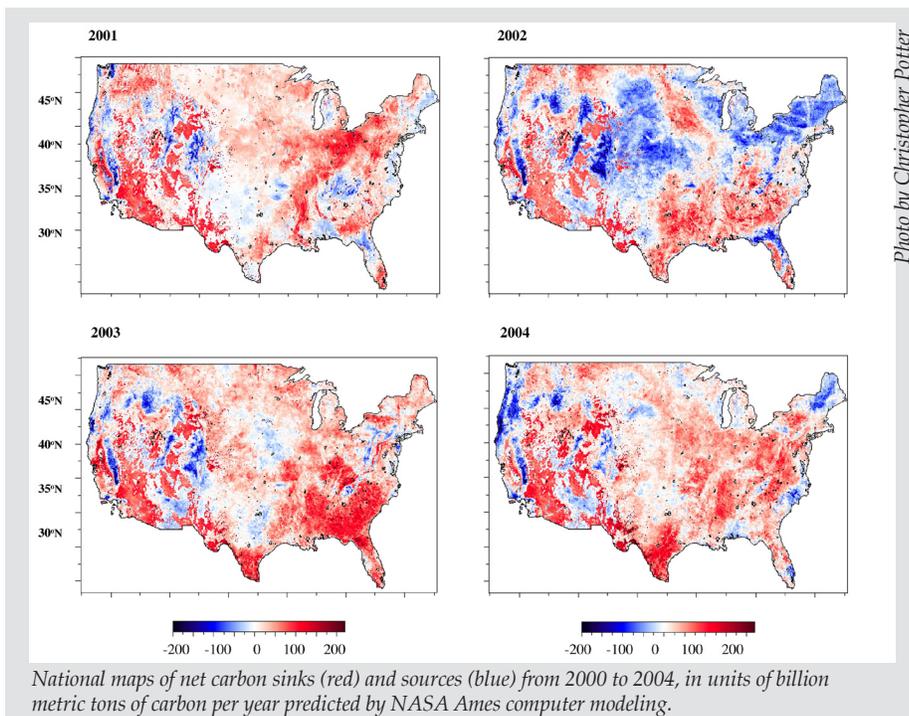
Carbon loss from green plants and other organic matter results from an earlier and warmer springtime climate in the mountainous West, which accelerates snow melt and water losses from the higher elevation ecosystems. More extensive wildfires later in the summer also lead to carbon loss.

Potter and research collaborators from California State University, Monterey Bay, and the University of Arizona, Tucson, presented their findings on Dec. 13, 2007 during the annual American Geophysical Union fall meeting at San Francisco's Moscone West Convention Center.

"According to data from the MODIS sensor on NASA's Terra satellite and Ames computer modeling, the forested mountain areas of the West still have the capacity to take up carbon from the atmosphere so long as wildfires do not increase notably," Potter also observed.

The scientists conducted their research during the last four years and used satellite data, information from ground-based instruments and readings taken from Earth-observing airplanes to arrive at a computer model for the study.

"The computer model we used reads in current satellite and climate



data from sensors throughout the world and predicts past, present and

future ecosystem carbon changes," Potter explained.

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Ames Advanced supercomputing facility opens

BY HOLLY A. AMUNDSON

A VIP tour of the Army supercomputers operated at the NASA Advanced Supercomputing (NAS) facility at Ames kicked off an event on Nov. 29, 2007 to celebrate the opening of the new Army High Performance Computing Research Center (AHPCRC).



NASA photo by Eric James

From left to right: Lt. Col. Fredrick Ludden; Charlie Nietubicz, chief, Advanced Computing and Computational Sciences division director, Major Shared Resource Center; Dr. John Parmentola, director for Research and Laboratory Management for the U.S. Army; and Fred D. Robinson, commanding general, U.S. Army Research, Development and Engineering Command, during the recent event celebrating the opening of the new Army High Performance Computing Research Center.

Ames' participation in the AHPCRC consortium, which includes Stanford University, the Army, High Performance Technologies, Inc., and several minority universities across the U.S., will yield several benefits: leverage of the Army's investments and expertise in HPC; collaboration with consortium partners in multiple research areas of interest to the agency; and many more.

Following the photo opportunity and tour at the NAS facility (see photo), VIP invitees of the event (including Major General Fred D. Robinson, Jr., Commanding General, U.S. Army Research, Development and Engineering Command; Dr. Charbel Farhat, director of AHPCRC; and Dr. John Hennessy, president of Stanford University) were taken to Stanford for a ceremony, which included speeches from Congressman Xavier Becerra; Dr. John Parmentola, director for Research and Laboratory Management for the U.S. Army; and Ames' Dr. Steven Zornetzer, Associate Center Director for Institutions and Research.

The event concluded in the afternoon with tours of the NAS facility.

Hurricane animation improves storm damage prediction

by John Bluck

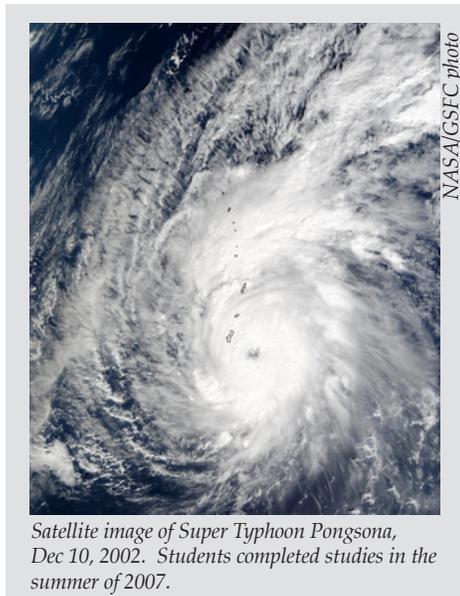
New hurricane animation developed by NASA can help forecasters predict overall storm damage more accurately, thanks to a student intern science team that developed new computer graphics using satellite imagery.

The students used data from the NASA Quick Scatterometer (QuikScat) satellite, Tropical Rainfall Measuring

and made more accurate animations of the actual storms," he explained.

Skiles and one of five interns who worked on the project presented their findings Dec. 12, 2007, during the an-

tracks for 1980 through 2005 showed that cyclones and typhoons are more prevalent in the Pacific than are hurricanes off the eastern U.S. coast," Skiles said.

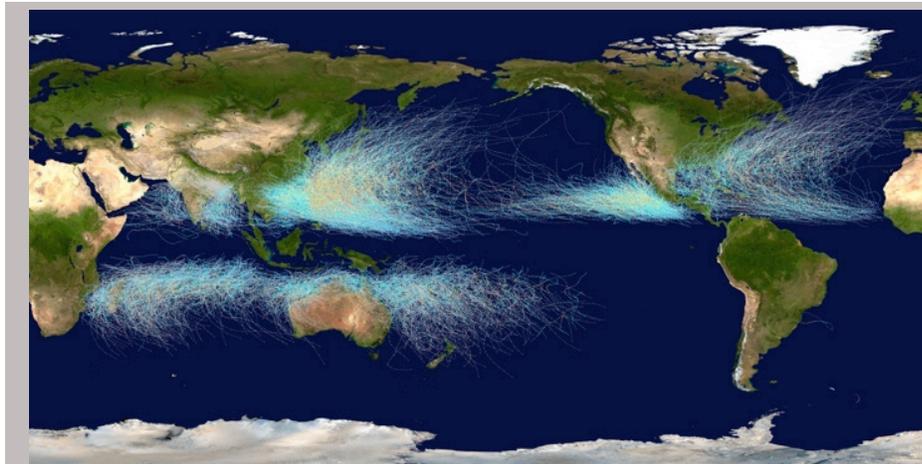


Satellite image of Super Typhoon Pongsona, Dec 10, 2002. Students completed studies in the summer of 2007.

Mission, Jason-1 and Aqua to create accurate storm animations instead of the cartoon-like graphics seen on many television weather forecasts. The students were engaged through Develop, a NASA Applied Sciences program that extends science research to local communities. Develop student teams research NASA science capabilities relevant to community concerns and create advanced computer-generated visualizations demonstrating research results.

The team developed precise animations in collaboration with the National Oceanic and Atmospheric Administration's (NOAA) Pacific Region Integrated Climatology Products (PRICIP) project.

"You probably have seen hurricane animation on TV that looks like a pinwheel spinning over a satellite picture. What you see on television weather reports is an image of the top of the clouds," said Jay Skiles, an Earth scientist at NASA Ames. "Our team of students has taken accurate observations from the ocean surface and atmosphere from actual NASA satellite data



This graphic illustrates that there are many more typhoons and monsoons than hurricanes in the Pacific region. Students animated ocean storms in the Western Pacific Ocean at NOAA's request. Tracks in the graphic above are courtesy of the National Hurricane Center and Joint Typhoon Warning Center. Background Image courtesy of NASA.

nual American Geophysical Union fall meeting at San Francisco's Moscone Convention Center.

"By understanding past storm anatomies, it may be possible to predict destruction and damage of future Pacific storms as well as others around the world," Skiles explained. The students' animation uses real data to indicate the storm's size and intensity, according to Skiles. The animation shows real rain, wind and temperature data over maps of the Pacific Rim area.

"The students' animations, combined with other socio-economic data compiled by NOAA, will yield a better understanding of the potential for destruction that Pacific storms have," Skiles said. "That's the purpose of the project."

The PRICIP project may eventually become an interactive decision-support tool to assist decision makers as they lead recovery from natural hazards, reducing coastal vulnerability to storms, according to Skiles.

At NOAA's request, the students animated three storms in the western Pacific Ocean: Typhoon Chata'an (July 2002), Super Typhoon Pongsona (December 2002) and Cyclone Heta (January 2004).

Hurricanes, cyclones and typhoons are all ocean storms, and they form in different parts of the world. Storm

"The PRICIP anatomies convey the impacts associated with extreme storm events and the causes of them to emergency managers, coastal planners and the general public in a manner that is easy to access, understand and use," said John Marra, coastal natural hazards specialist from the NOAA Integrated Data and Environmental Applications Center in Honolulu, Hawaii. "The NASA Ames Research Center and the Develop team contributed significantly to this effort. From the PRICIP perspective, the content the students created was a great example of how diverse types of satellite data could be integrated and visualized. It also provided us with a wonderful illustration of the mutual benefits of collaboration."

"NOAA gave the students the names of the storms, and that's about it,"

Skiles said. "The students looked at about eight satellites and determined that four would yield the data necessary to show what NOAA wanted to see in the graphics."

For example, the students used Jason-1's radar altimeter data to determine the sea level height, sometimes called storm surge, of all the storms they studied. According to Skiles, each satellite data stream required differ-

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Fires, moon, high-tech collaborations highlight 2007

BY MICHAEL MEWHINNEY

Devastating wildfires, moon research and high tech Silicon Valley collaborations were top stories for NASA Ames Research Center in 2007.

California Wildfires:

NASA helped firefighters battle some of the worst wildfires in the state's history. In September, NASA flew the remotely piloted Ikhana airplane and its instruments that can see through smoke over the Lick wildfire near Gilroy, Calif. NASA Ames developed the Autonomous Modular Sensor-Wildfire instrument



NASA Dryden photo
NASA's Ikhana, a remotely piloted science aircraft.

to look through the smoke to see hot spots, flames and temperature differences. The data is then overlaid on maps and made available to fire incident commanders to assist them in allocating resources. In October, NASA pilots again flew the Ikhana over numerous raging wildfires in Southern California. The flights were part of the Western States Fire Mission that demonstrated improved wildfire imaging and mapping capabilities of the sophisticated sensor and real-time data communications equipment developed at NASA Ames.

To view and download images and for additional information, visit: http://www.nasa.gov/vision/earth/lookingatearth/socal_wildfires_oct07.html

Lunar Exploration:

NASA announced that the new Lunar Science Institute would be based at NASA Ames, ensuring that the center will play a key role in future exploration as NASA returns to the moon and later travels to Mars. Next year, NASA Ames is going to have a mission that will slam into the moon. The Lunar CRater Observation and

Sensing Satellite (LCROSS) mission will provide scientists with a wealth



The Lunar CRater Observation and Sensing Satellite (LCROSS) mission to look for water on the moon will be a 'secondary payload spacecraft.' Launch is scheduled for October 2008 on an Atlas V rocket from Kennedy Space Center, Fla.

of data that will tell us a great deal about the lunar surface and help prepare NASA to put boots on the moon by the end of the next decade. As evidence of the significant interest in the moon by the American public, a "Return to the Moon Family Night" held at NASA Ames drew more than 6,000 local residents.

For more information and images, visit: <http://www.nasa.gov/centers/ames/missions/2007/lcross.html>

Collaborations:

NASA Ames forged key partnerships with some of the best and brightest companies on the planet, including its Silicon Valley neighbors, Google and Microsoft. Under an agreement with Google, NASA Ames is helping make NASA's vast archives of images and planetary data more accessible to the public. Ames is working with Google to develop Google Moon so that that everyone can take a virtual trip to the lunar surface. New higher



resolution lunar imagery and maps that include NASA multi-media content are available on the Google Moon Web site.

NASA Ames also collaborated with Microsoft to develop Photosynth, a new immersive imaging technology that enables viewers to see detailed images of NASA. In August 2007, NASA and Microsoft released an inter-

active, 3-D photographic collection of the space shuttle Endeavour preparing for a mission to the International Space Station.

The software uses photographs from standard digital cameras to construct a 3-D view that can be navigated and explored online. The software combines hundreds or thousands of regular digital photos of a scene to present a detailed 3-D model of a subject, giving viewers the sensation of smoothly gliding around the scene from every angle.

A collection can be constructed using photos from a single source or multiple sources.

The NASA images can be viewed at Microsoft's Live Labs at: <http://labs.live.com/>

For more information on Google Moon, visit: <http://www.google.com/moon/> For more information on Google Earth, visit: <http://earth.google.com>

Exploration:

NASA Ames continues to play a major role to support the space shuttle program with its work in thermal protection systems and the heat shields that protect the space shuttle during its fiery re-entry to the Earth's atmosphere.

This year, NASA Ames developed a new space shuttle tile inspection method using wireless scanners to replace manual inspection. NASA first used the new method in August 2007 to look for cracks and other imperfections in some of the 24,000 tiles that cover space shuttle Endeavour. In the past, workers at NASA Kennedy Space Center, Fla., visually analyzed tiles and measured dings and cracks with small hand-held scales. Each scanner weighs approximately 2.9 pounds and is about the size and shape of a small teapot. Technicians place the machine on the tile's flaw to scan it. In about three seconds, the data are computerized and archived.

Engineers can scrutinize computerized 3-D pictures of the flaws. The images show the length, width and depth of the flaws on the surface of the tiles. Ames engineers developing a heat shield system for NASA's new

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Ames Contractor Council holds 2007 Excellence Awards ceremony

BY DOREEN COHEN

The Ames Contractor Council recently hosted its 2007 Excellence Awards Ceremony in the Ames main auditorium. Awards chair Kathleen Starmer served as master of ceremonies with president Chris Johnson presenting the certificates along with Deputy Center Director Chris Christensen.

The awards ceremony recognizes deserving contractor employees and teams of contractors for exceptional performance on NASA Ames Research Center programs, presented annually in front of their peers and management from both the civil servant and contractor staff.

There were 22 individuals and 16 teams honored this year in recognition of their service to Ames.

Intrinsix Technologies, Constellation Data Systems, one of the award recipients at the recent Ames Contractor Council 2007 Excellence Awards Ceremony.



NASA photos by Dominic Hart



QSS Group Inc., a Perot Systems Co., PKI Support Team was honored recently at the Ames Contractor Council 2007 Excellence Awards Ceremony.



Above, left to right: Ames Contractor Council President Chris Johnson; award recipient Dominic Wong, QSS Group Inc.; and Deputy Center Director Marvin "Chris" Christensen.

NASA's retirement and benefit programs transition to NSSC

NASA's retirement and benefit programs will transition to the NASA Shared Services Center (NSSC) beginning Jan. 6, 2008. NASA employees will need to contact the NSSC with questions pertaining to health insurance benefits, life insurance, civilian or military deposits, survivor benefit counseling and retirement estimates. Local Center Human Resources (HR) offices will no longer provide this service.

The NSSC understands that the activities associated with these life events are very important to employees. The NSSC is committed to providing the same exceptional level of service employees received from their local center human resource office.

For additional information about this transition, visit the NSSC Customer Service Web site at: <https://www.nssc.nasa.gov/customer-service>, contact the NSSC Customer Contact Cen-

ter at: 1-877-NSSC123 (1-877-677-2123) or e-mail: nssc-contactcenter@nasa.gov. You may also contact the Ames

NSSC center liaison, Elena Martinez, at ext. 4-4135 or by e-mail at: Maria.E.Martinez@nasa.gov.

Major ecosystem carbon loss predicted

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The researchers estimated past and future carbon balance for ecosystems in the western United States. Carbon balance is the difference between carbon sinks (such as carbon captured from the air by green plants) and carbon sources (such as factories and automobiles that burn fuel and put carbon into the air).

"We conducted this research because the influences of climate change on carbon held in ecosystem vegetation and soils — an important mechanism for offsetting fossil fuel carbon emissions — are not well understood, making projections in a changing climate quite uncertain," Potter explained.

According to Potter, scientists need to gather information about current and past places where carbon is trapped to provide a point of comparison for future actions.

"We cannot say yet with certainty what the ecosystem carbon effects will be on climate regionally, but we do know that land areas anywhere in the world that do not consistently sequester and store carbon over several decades will add notably to already increasing atmospheric carbon dioxide from fossil fuel burning, which is the main human factor contributing to global warming," Potter said.

Tips for a “Green” holiday season, and how to reduce waste

BY STACY ST. LOUIS

While the annual holiday season brings good cheer, it also delivers more solid waste to the landfill and consumption of natural resources. Americans throw away about 25 percent more trash between Thanksgiving and New Year’s Eve. That’s an additional 5 million tons of garbage! Regardless of which holiday you celebrate, take a minute to consider the following ideas for a “green” holiday season this year.

- As an alternative to traditional wrapping paper, try using pages from an old

If every American family wrapped just three holiday presents in reusable materials, it would save enough paper to cover 45,000 football fields.

magazine, old maps, fabric, newspaper or decorative tins.

- Reduce packaging by giving an “experience” such as: concert or movie

tickets, gift certificate to a local spa or dinner restaurant, cooking or dance lessons, a gym membership, a pass to

Every year, there are 2.65 billion holiday cards sold in the U.S. That’s enough to fill a football stadium field 10 stories high.

local museums, a Bay cruise or an annual National Parks pass.

- When shopping for gifts and holiday food, carry your own canvas bags.

- For holiday parties, use reusable dishes, cups and utensils, and cloth napkins.

- If you send holiday cards, look for those

made of recycled paper. Eliminate envelopes and send a postcard instead.

- Make gift tags or decorations from last year’s holiday cards.

- Consider getting alternatives to a cut tree, such as a live potted tree or an artificial tree.

- Use a timer on your holiday lights to avoid lights turning on too early or staying on all night.

- Buy certified organic, free-range turkeys for your holiday celebrations. Raised without confinement, with access to the outdoors, and fed organic grain, these turkeys actually have more muscle and lower fat content than typical store-bought turkeys. Plus, hormones and antibiotics are never used on the animals, making them even healthier for your family to consume.

- Donate old electronic gadgets. For a local listing of facilities, visit www.ciwmb.ca.gov/Electronics/Collection/

With careful thought, it is possible to reduce waste, conserve resources, and promote environmental protection during this busy season.

NASA transforms into ‘North Pole’ for children’s fantasy flight

BY JONAS DINO

The Cops Care Cancer Foundation hosted its annual Christmas Fantasy Flight for children with cancer and other life-threatening illnesses on Saturday, Dec. 15, 2007. The event was held in the San Jose Police Department Air Support Unit hangar, N211, at NASA Ames.

Children from San Francisco Bay Area hospitals, including Lucile Packard Children’s Hospital at Stanford, Kaiser Permanente Santa Clara Medical Center and Children’s Hospital and Research Center Oakland, were treated to a day of fun with their families. For the event, the hangar was transformed into the ‘North Pole’ filled with fun activities, food, drinks and music.

Highlighting the event was the arrival of Santa in a police helicopter, bearing gifts for each child and his or her siblings. Other activities included a ‘bubble zone’, jumper houses, face painting, carnival games and special access to police and fire department vehicles.

Cops Care CanPolice officers and firefighters from the San Jose Police Department and Sunnyvale Department of Public Safety greeted the children at Yahoo’s Sunnyvale campus before boarding buses to NASA Ames. Upon



NASA photo by Dominic Hart

Santa arrives at Ames to give presents to the kids waiting for him during the recent Cops Care Cancer Foundation’s annual Christmas Fantasy Flight event.

for additional photos see page 14

their arrival, a variety of special guests, including Ultimate Fighting Champion Daniel Puder and California Assemblymember Alberto Torrico, local police officers, cartoon characters and more than 100 foundation volunteers, greeted the children to make each one feel like a VIP.

In addition, each family received check-in gifts and a gift card to help purchase Christmas dinner from Yahoo and the Cops Care Cancer Foundation.

For more information about the Cops Care Cancer Foundation, visit the foundation Web site at <http://www.CopsCareCancerFoundation.org>

NASA, partners enable remotely piloted plane to fly over wildfires

BY JOHN BLUCK

If not for the extreme effort of a NASA-partners team, a remotely piloted aircraft would not have been able to fly over Southern California wildfires in October 2007 to aid firefighters,



NASA Dryden photo

With smoke from the Lake Arrowhead, Calif., area fires streaming in the background, NASA's Ikhana remotely-piloted aircraft heads out on a wildfire imaging mission, Oct. 24, 2007.

according to observers.

The California Governor's Office of Emergency Services and the National Interagency Fire Center, Boise, Idaho, had asked NASA to fly wildfire missions to provide near real-time aerial fire images to incident commanders to help them to deploy firefighters and equipment.

The flights of the Ikhana aircraft, which took off from NASA Dryden Flight Research Center, Edwards Air Force Base, Calif., seemed simple enough as described in news stories. Firefighters used the aircraft's smoke-piercing images help battle some of the 15 fires that destroyed about 2,100 homes and charred 800 square miles, according to news reports.

Though the smoke from the California wildfires was thick, firefighters saw through it, thanks to a special NASA autonomous aerial imaging system onboard the remotely piloted aircraft, according to headlines that appeared on Oct. 24, 2007.

The system, developed by NASA Ames, took aerial, thermal infrared images of fire hot spots from as high as 27,000 feet. Called the Autonomous Modular Sensor (AMS) Wildfire Instrument, the system on the aircraft delivered data in real-time by a satellite data link for distribution to

incident commanders near the fires via the Internet in as little as five minutes.

But the missions of the Ikhana to observe Southern California's wildfires may not have taken place, or begun as early as they did, if not for the efforts of NASA people and their partners from industry and the academic world.

At NASA's Dryden, the sensing system had been removed from the airplane in early August – the typical end of the western wildfire season. Workers also had begun dismantling the Ikhana aircraft's wings while preparing the flying machine for another aeronautical research experiment in the upcoming 2008 wildfire season. Then the call for help came. Workers scrambled and toiled into the night to reinstall the sensing system and prepare the aircraft for fire operations.

"The entire crew stayed up much of the night to get not only the instrumentation, but the aircraft ready for the mission," said Jim Brass, the co-mission manager with Vince Ambrosia, who was working from the National Interagency Fire Center in Boise, Idaho. "I think we had at least 15 people involved from NASA's Ames and NASA's Dryden." The system can see the thermal infrared band that humans cannot see, according to Brass.

"We were impressed by the interest of the incident commanders, and that they used it as much as they did," said Brass.

"The University of California Santa Cruz, through its University Affiliated Research Center, is proud to support NASA Ames in relief of the Southern California fires," said William Berry, UARC Director. "Our people have shown incredible dedication, and it pleases us all that their efforts demonstrate how this new technology can be so valuable to firefighters on the front lines. The experimental capability to provide real-time

wildfire hot-spot information by seeing through smoke with infrared eyes is an incredibly powerful tool in these unfortunate circumstances. We hope to work with NASA and other public agencies to make this capability more widely available and accessible in the future," Berry added.

"I do not know how many hours Pat (Grant) and Ted (Hildum, both of the University of California, Santa Cruz and) any other University Affiliated Research Center staff have gone without sleep to get the sensor working so that the flight could happen, but I do know they deserve tremendous praise, not only from us, and from NASA, but from all of California," said Larry Hogle, of the University of California, Santa Cruz, whose office is at Ames.

"In preparation for the last group of flights we had failure of a computer disc drive at 40,000 feet before the wildfires in Southern California," explained Ted Hildum of the University of California Santa Cruz, who works at Ames as a sensor engineer. "We had to fix that hard drive to get the sensor ready to fly," he explained.

"We had to entirely replace the hard drive and reinstall the operating system and our special computer code," Hildum said.

According to Hildum, Dryden people had been getting ready to install new equipment on the Ikhana, and they had removed the wing pod, which is on the left wing. The pod is about eight feet long and about three feet high and two feet wide. "That's where our sensor is, and the rest of data system and infrared," Hildum explained.

"Putting the pod back together and hanging it on the airplane is pretty easy, but the thing that took all the time was rebuilding the disc drive," Hildum observed. It took all Tuesday (Oct. 23, 2007), 7 a.m. to about 9 p.m. PDT, 14 hours altogether to be ready for flight the next morning," Hildum recounted.

The wildfire sensor that the Ikhana carried contains a number of main pieces. These include the infrared sensor and its data system and the in-flight data processing computer. The sensor is precisely calibrated and sensitive to specific thermal infrared wavelength so, it can peer through thick smoke and haze to take temperatures, discern hot spots and monitor the movement of wildfires during a

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Two 'GREEN' events highlight Earth-friendly energy resources



NASA photo by Dominic Hart

Two Global Research into Energy and the Environment at NASA (GREEN) events were recently held at the center. The first was with Dr. Marty Hoffert (left photo) who presented a director's colloquium entitled 'Electricity from Orbit: The case for R & D.' Hoffert spoke about how cost-effective space solar power (SSP) could be a breakthrough technology for large-scale power generation, provide highly flexible power distribution and a sustainable carbon-neutral base load for Earth. Hoffert is Professor Emeritus of Physics and former chair of the Department of Applied Science at New York University.



NASA photo by Eric James

The second GREEN event was entitled 'Renewable energy: What's NASA's role?' This event was the second in a series of seminars to consider how tools and expertise developed by NASA for the exploration of space can be applied to problems associated with sustainable energy and clean technologies on planet Earth. The afternoon session consisted of a lecture from an expert in renewable energy technologies, a review of NASA's historic and current roles in energy-related research and a discussion of how NASA might contribute to renewable energy in the future. The invited speakers included Professor Ali Shakouri, University of California, Santa Cruz, and Dr. Valerie Lyons, NASA Glenn Research Center, Cleveland, (left lower photo.)

Fires, moon, high-tech collaborations highlight 2007

continued from page 5

spaceship Orion already are using a larger, desktop version of the scanner



NASA photo by Dominic Hart

NASA Ames' space shuttle tile wireless scanner, which replaced manual inspections of the tiles.

For high-resolution images of the scanner, visit: http://www.nasa.gov/mission_pages/shuttle/news/wireless_scanner.html

The Year Ahead:

Next year promises to be even more exciting for NASA Ames. NASA will be celebrating its 50th anniversary. In the fall, Ames will launch the LCROSS on its mission to the moon in

search of water ice at one of the lunar poles.

In 2009, the Kepler mission will begin its search for habitable planets. Kepler is NASA's first mission capable of finding Earth-size and smaller planets. The Kepler mission will monitor the brightness of stars to find planets that pass in front of them during the planets' orbits.

Possibilities of water and life on Enceladus

continued from page 2

methanogen ecosystems found on Earth," McKay explained. "Water rock reactions produce the hydrogen from basalt," McKay said, after citing two types of chemical reactions.

According to McKay, if the methane is going to be recycled back to hydrogen, then there needs to be a region in Enceladus with temperatures about 500 degrees Celsius (932 degrees Fahrenheit) or more.

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. The Jet Propulsion Laboratory (JPL), a division of the California Institute of Technology in Pasadena, Calif., manages the mission for NASA's Science Mission Directorate. The Cassini orbiter was designed, developed and assembled at JPL.

to study heat shield samples tested at Ames.

Get to know the Ames Traffic Management Plan

BY ANN SULLIVAN

Did you know that Ames has a traffic management plan? Or that in the past 12 months, Ames' law enforcement officers wrote 1,550 traffic citations?

Of those 1,550 citations, 578 were for failing to come to a complete stop at a stop sign, while more than 300 drivers were cited for exceeding the

are three types of tickets: a courtesy warning, with no traffic violation points; a correction notice for vehicle safety/equipment violations; and the standard notice for a violation that may result in the assessment of points (e.g., a speeding ticket). Points can vary from two for a minor infraction to 12 for reckless driving or for failing to obey a traffic or pedestrian cross-

of age, must be restrained in a child safety seat that meets California motor vehicle safety standards. If you ride a motorcycle or a bicycle, wear an appropriate helmet. You must have a valid driver's license, and your vehicle must be licensed and insured.

The maximum speed limit at Ames is 25 mph unless otherwise posted. The speed limit at all entry points and in all parking lots is 15 mph. Should you be tempted to exceed the speed limit, please keep in mind that Ames security police officers do use radar devices to detect speeders.

If your vehicle breaks down, move it off the pavement to the right side of the road. Get everyone out of the vehicle and off the road if the vehicle cannot be moved. A vehicle with a flat tire should be driven slowly off the road. Turn on emergency warning lights. Use taillights if the vehicle doesn't have warning or hazard lights. At night, also turn on the car's inside lights. Contact the Ames Emergency Dispatch Office if assistance is needed or in an emergency.

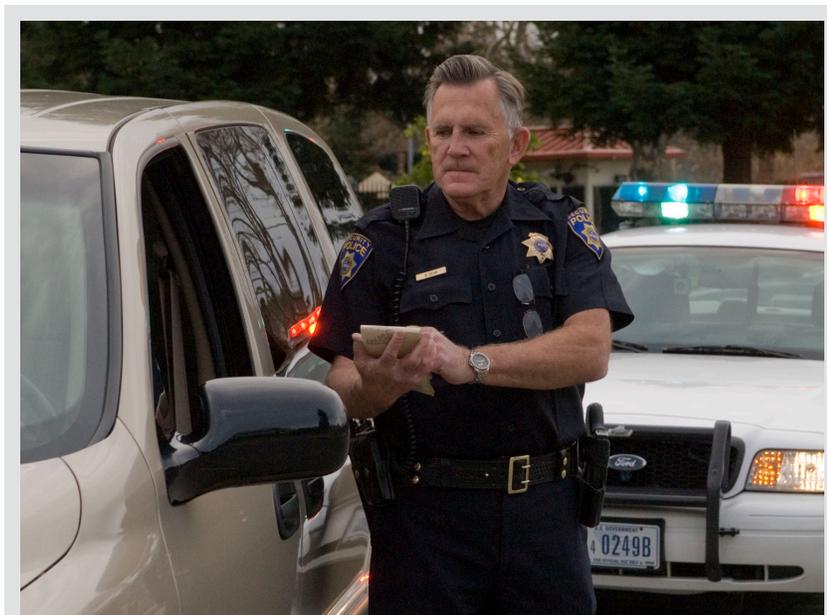
Of course, it goes without saying that it is unlawful for anyone under the influence of alcohol or drugs to drive a vehicle at Ames, or to drive in a reckless manner.

Pedestrians should use common sense when walking or jogging at Ames, by using sidewalks when available, walking on the left side of the road if there is no sidewalk, and yielding the right of way to all vehicles if crossing anywhere except within a crosswalk.

Bicyclists must obey all traffic signs and signals, not ride more than two abreast except on a path or shoulder of a road, ride on a bike path if one is available, and at night, have a front white light and a red reflector on the rear.

The Ames traffic management plan is in place, and its regulations are enforced, for your safety and for the safety of everyone who works at or visits Ames. Don't become a traffic statistic!

To see the complete Ames traffic management plan, go to <http://server-mpo.arc.nasa.gov/Services/CDMSDocs/Centers/ARC/Dirs/APR/APR1600.5.html>



NASA photo by Eric James

Officer Robert Dean of Ames' Protective Services writes up a ticket for a motorist for speeding at the center. The maximum speed limit at Ames is 25 mph unless otherwise posted. The speed limit at all entry points and in all parking lots is 15 mph.

posted speed limit. There also were 29 motor vehicle accidents at Ames during that period. The most common reasons for accidents are unsafe speed and unsafe backing. Most resulted in some vehicle damage, but fortunately, only a couple of injuries were reported.

"Protective Services makes every effort to ensure that motorists, bicyclists and pedestrians alike can safely traverse the roads and pathways at Ames," said Ken Silverman, chief of security. "By adhering to the Ames traffic management plan, Ames' employees, visitors and guests can help us ensure a safe environment for everyone."

Violating the traffic management plan can result in a ticket issued by Ames' security police officers. There

walk or sign resulting in serious injury to a pedestrian.

Accumulating 12 or more points in a two-year period may result in suspension of driving privileges on Ames property for 30 days or more for non-criminal violations. In addition, criminal activities resulting from the operation of a motor vehicle on Ames property may be referred to the United States Attorney's Office for criminal prosecution.

NASA security police have authority to enforce the Ames traffic plan, which doesn't differ much from state traffic laws. Obey the speed limit. Stop completely at stop signs. Use common sense when driving. Wear seat belts. Children under the age of four years, regardless of weight, or weighing less than 40 pounds, regardless

NASA, partners enable remotely piloted plane to fly over wildfires

continued from page 8

long period of time.

The wildfire data is overlaid on Google Earth maps and sent in near-realtime to the National Interagency Fire Center in Boise, Idaho, and made available to fire incident commanders at the fires to help them to decide how to use their fire-fighting people and equipment.

"I designed the new data system for the sensor -- built a lot of it. This system is hardware and software. It records imagery from the infrared sensor, stores it on a disk and telemeters it back down to the ground. It's received in the Ikhana ground station at NASA's Dryden. It's then sent to a server computer at NASA Ames," Hildum said.

"At that point it's massaged a little bit by Francis Enomoto of NASA Ames," explained Hildum. "He reformats the data so it can be displayed in Google Earth, which is a visualization tool. It put the images from our sensor onto a terrain map that can be viewed on the Internet."

"Sally Buechel wrote the software, which takes the image and corrects it to be draped over terrain maps, and it also detects fire perimeters," Hildum added. Buechel works at NASA Ames and is employed by Bay Area Environmental Research Institute. The software also automatically detects and identifies hot spot data in the data stream, according to Ambrosia.

"My job was to stand in for Sally Buechel to run the AMS wildfire instrument, and the thermal scanner that takes imagery of temperatures," said Patrick Finch, another team engineer who works at NASA Ames for California State University, Monterey Bay.

"The instrument was developed by Ted Hildum and his group," Finch said.

"Sally Buechel also wrote all of the software to process the imagery into a useful product, a color-coded image showing active hotspots and smoldering areas and unburned areas," Finch continued.

"When you're looking at really hot, burning fires, the color palette would change from a nice green from unburned areas, and then as things got hotter, would fade into a very bright, white color where you'd see some reds where things are warm but not necessarily actively burning," Finch explained.

"We flew a few different times during the week," Finch said. "They

were trying to keep the flights at 10 hours or less," Finch added.

"The aircraft headed south to San Diego and the border region to cover fires there (Harris Fire) then progressively moved north to cover remaining fires," according to Ambrosia, the principal investigator for the missions, who described the first flight of the series that took off Oct. 24, 2007.

On that first mission, the aircraft gathered images and data from at least 11 fires: the Harris, McCoy, Witch / Poomacha, Coronado Hills, Rosa, Slide, Grass Valley, Buckweed, Ranch, Magic and San Clemente. The aircraft collected and transmitted 99 image files, flew more than nine hours and returned to NASA's Dryden.

"During the course of the four missions over the Southern California wildfires, the Ikhana operated on distinct flight paths to ensure collecting the most pertinent and timely data possible over the various evolving fire events," Ambrosia said. "During some missions, multiple passes during the day were made over critical, active fires to provide fire movement data to teams," he added.

"Users in the field are very pleased with the Ikhana imagery as 'real data'," said Tom Zajkowski, a U.S. Forest Service remote sensing analyst who was at the Witch Fire. According to Zajkowski, the imagery showed how effective burnout operations were, locating hidden hotspots after fires went by.



NASA photo
NASA Ames engineers Sally Buechel and Ted Hildum prepare to load the Autonomous Modular Scanner into the Ikhana remotely piloted aircraft's payload pod, Oct. 23, 2007 to observe the California wildfires

The lead for the sensor, Jeff Myers of the University of California Santa Cruz; the data systems lead, Don Sullivan of Ames; and others from

Ames also worked on the wildfire missions.

For additional images and more information about the wildfire demonstrations, please visit: <http://www1.dfrc.nasa.gov/Gallery/Photo/Ikhana/index.html>

Hurricane animation improves predictions

continued from page 4

ent processing methods and analysis. "So, that's why it took the students 10 weeks, or all summer of 2007, to complete the project."

"Because of the differences in data streams from the satellites, it probably is not possible to produce these animations in real time," Skiles said.

Skiles said NOAA is enthusiastic about the new hurricane animation and wants interns to continue to improve it. "At NOAA's request, this project will be continued in the summer of 2008, with new students," Skiles said.

The five students who worked on the project are Casey Teske, University of Montana, Missoula; Nicole Simons,

University of Oklahoma, Norman; Josh Ingham, University of Idaho, Moscow; Frank Garcia, University of California Santa Barbara; and Seema Gupta, Wellesley College, Wellesley, Mass. The mentors for the project were Cindy Schmidt of San Jose State University, San Jose, Calif., who works at Ames; and Jay Skiles of Ames.

The Develop Program began in 1998 when three students authored a paper titled "Practical Applications of Remote Sensing."

For more information on Develop, visit: <http://develop.larc.nasa.gov>

The students' animation will be available on the NOAA Web site at <http://www.noaa.gov>.

Ames Ongoing Monthly Events Calendar

Ames Amateur Radio Club, third Thurs., of ea. month, 12 noon, N-T28 (across from N-255). POC: Michael Wright, KG6BFBK, 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. POC: Julie Nottage at jnottage@mail.arc.nasa.gov, ext. 4-3711.

Ames Bowling League, Homestead Lanes on Thursday nights at 6:20 p.m. Seeking substitute bowlers. Questions to sign up: Mike Liu at ext. 4-1132.

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 Wednesday of ea. month, 11 a.m., Bldg. N-200, Committee Room. POC: Chris Johnson, (650) 938-8017.

Environmental Forum, first Thursday every other month, 9 a.m. - 10 a.m., T20-G conference Rm. 129. URL: <http://q/qe/events/EHS-series/> POC: Stacy St. Louis, ext. 4-6810.

Ames Federal Employees Union (AFEU) Mtg., First Wednesday of November (7th), noon. First Wednesday of December (5th), noon. Bldg. N-247, Rm. 109. Beginning 2008, third Wednesday each month, same location. 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: Miwa Hayashi, ext. 4-1397, mhayashi@mail.arc.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.

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. N-241/Rm 237. POC: Rosalyn Jung, knitfan2@yahoo.com or Diane Alexander at ext. 4-3140. URL: <http://knit.arc.nasa.gov>

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 Sailing Club Mtg., second Thursday of each month (March through Nov), from 12 p.m. - 1 p.m., Bldg. N-262, Rm. 100. URL: <http://sail.arc.nasa.gov/>. POC: Becky Hooey, ext. 4-2399.

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.

Safety Data

NASA-Ames Occupational Illness-Injury Data for Calendar Year-to-Date 2007 Jan. 1, 2007 - Nov. 30, 2007

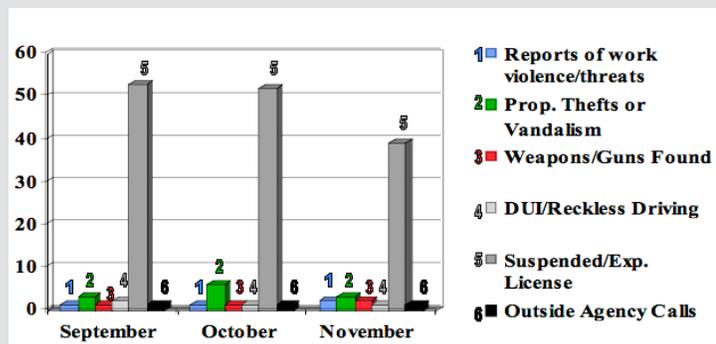
	Civil Servants	Contractors
First aid cases	13	14
Lost Workday cases	0	2
Recordable cases	2	4
Restricted duty days	0	2

Above data are as of Nov. 30, 2007. May be subject to slight adjustment in the event of a new case or new information regarding an existing case.

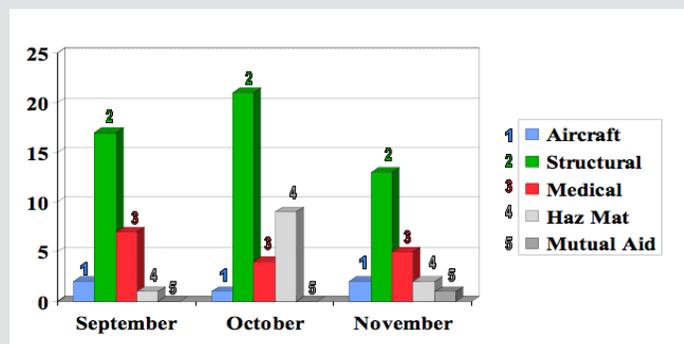
Protective Services monthly activity

A statistical summary of activities of the Protective Services Division's Security/Law Enforcement and Fire Protection Services units for the month of November 2007 is shown below.

Security/Law Enforcement Activity



Fire Protection Activity



Ames Classifieds

Ads for the next issue should be sent to astrogram@mail.arc.nasa.gov and must be resubmitted for each issue. Ads must involve personal needs or items; (no commercial/third-party ads) and will run on a space-available basis only. First-time ads are given priority. Ads must include home phone numbers; Ames extensions and email addresses will be accepted for carpool and lost and found ads only. Due to the volume of material received, we are unable to verify the accuracy of the statements made in the ads. Caveat emptor!

Transportation

'95 Toyota Camry, emerald green exterior, 4dr, 5-speed manual transmission. 187,500 miles, great condition, runs smoothly, gives 26mpg, has recent smog certificate and complete maintenance records since 1995! \$3,000. Anupa (650) 862-2869

Miscellaneous

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.

E-bike for sale/donation to local school program. Fully loaded 24V E-bike by EV Global with brand new battery cells is available in exchange for a \$400 donation to the PACT program, a local Mountain View school (originally sold for \$1800.) Bike is fully loaded (two panniers, headlight, taillight, front shocks..) will travel 12mph on electric alone. Call Krisstina at (650) 964-3926 or e-mail klwilmoth@sbcglobal.net if you'd like to take a look.

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<http://naccenter.arc.nasa.gov/lodging.html>



Astrogram deadlines

Please submit articles, calendar and classified advertisements to astrogram@mail.arc.nasa.gov no later than the 10th of each month. If this falls on a weekend or holiday, then the following business day becomes the deadline. For Astrogram questions, contact Astrid Olson at the aforementioned e-mail address or ext. 4-3347.

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

Don't forget to purchase your baby shower, birthday, holiday gifts at Ames' two gift shops!

Visitor Center Gift Shop N-943 M-F, 10 a.m. to 4 p.m., ext. 4-5412

NASA logo merchandise, souvenirs, toys, gifts and educational items.

Tickets, etc... N-943 outside the main gate, 10 a.m. to 3:30 p.m., ext. 4-5412 and Beyond Galileo, 8 a.m. to 1:30 p.m. ext. 4-6873

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

See daily menu at: <http://exchange.arc.nasa.gov>

Moffett Field Golf Club with 'Tee minus 1' Grill and Sports Bar. Call (650) 603-8026.

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

The pool is heated year round! The pool is currently available for lap swim, pool parties and special events. POC -Chana Langley, Pool Manager (650) 603-8025. Memberships: single memberships: \$40/yr. Family memberships: \$60/yr. After purchasing a membership, there is an entrance fee: daily entrance fee - \$3/day or lap pass fee - \$40 for 20 uses. Platinum membership - \$360/yr. (no daily fee). Special events: include military training, swim team events, kayak role practice, etc. The cost for special events is \$50/hr.

Ongoing Vacation Opportunities

Lake Tahoe-Squaw Valley Townhse, 3bd/2ba, View of slopes, close to lifts. Per night: \$250, plus \$145 cleaning fee. Two night minimum. Includes linens, propane fireplace, fully equipped. Call (650) 968-4155, DBMcKellar@aol.com.

Bass Lake vacation rental, 4 mls south of Yosemite. 3bd/1.5 ba, TV, VCR, MW, frplc, BBQ, priv. boat dock. Sleeps 8. \$1,050/wk. Call (559) 642-3600 or (650) 390-9668.

Big Sur vacation rental, secluded 4bd/2ba house in canyon setting. Fully eqpd kitchen. Access to priv. beach. Tub in patio gdn. Halfway between Carmel and Big Sur. \$175/night for 2; \$225 for 4 and \$250 for more, plus \$150 cleaning dep. Call (650) 328-4427.

Pine Mountain Lake vacation home. Access to golf, tennis, lake, swimming, horseback riding, walk to beach. Three bedrooms/sleeps 10. \$100/night. Call (408) 799-4052 or (831) 623-4054.

Incline Village, Forest Pines, Lake Tahoe condo, 3 bdrms/2 ba, sleeps 8, fireplace, TVs/VCR/DVD, stereo w/CD player, microwv, W/D, jacuzzi, sauna, outdoor pool. Walk to lake. Close to ski areas. Visit web site for pictures: <http://www.ACruiseStore.com> \$135/night spring and fall, \$173/night summer and winter (holidays higher) plus \$125 cleaning fee and 12 percent Nevada room tax. Charlie (650) 743-8990.

New York, 5th Ave., one fully furnished bedroom apt. in 24 hour security bldg. overlooking Washington Square Park, \$1,000/week or 3,000/month, negotiable. Call (650) 430-6977.

Paris/France: Fully furnished studio. 5th arr, Latin Quarter, Notre Dame and Lie-St. Louis, \$1,400/week, negotiable. Call (650) 430-6977.

Santa Cruz townhouse, 2 bedrooms plus study, 2 baths, decks, totally furnished, 3 blocks from beach, available July, August, September; \$1,600 per month. Call (831) 423-5777 (H) or (831) 277-8476 (C).

Lake Tahoe cabin rental in Agate Bay, North Shore. 4bd/3ba tri-level, AEK, cable TVs, fireplace, BBQ, deck, sleeps 10. Closest skiing is Northstar, Alpine and Squaw. Rates are \$375 a weekend, \$1,000 a week. Call (408) 867-4656.

Florida west coast vacation in St. Petersburg, beautiful 2bd/2ba condo, fully equipped kitchen and furnished, sunset views, 1/4 mile from St. Pete Beach, monthly or 2 week minimum rentals only. Call (703) 299-8889 or e-mail: jdgoehler@aol.com

Monterey Bay vacation rental at Pajaro Dunes, 20 miles south of Santa Cruz, 3bd/2ba beach house with distinctive architecture. Beautiful ocean and valley views, only 150 ft from the beach, first-class tennis courts. \$700/wkend, \$2,100/wk including cleaning by the maid service when you depart. Call (408) 252-7260.

South Lake Tahoe large cabin surrounded by protected forest, 8 miles from Stateline Sleeps 12 comfortably, 4 bd/3ba. Hot tub/pool table/65" TV Matt (408) 482-5286

South Lake Tahoe cozy home backs up to large open meadow, 1 mile from Heavenly Valley. Sleeps 11, 3 bd/2.5 ba. Large deck with hot tub. Matt (408) 482-5286.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
ASTROGRAM
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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>.

Children enjoy holiday fantasy flight at Ames 'North Pole'

continued from page 7

The annual Christmas Fantasy Flight was hosted by the Cops Care Cancer Foundation for children with cancer and other life-threatening illnesses on Dec. 15, 2007. The event was held in the San Jose Police Department Air Support Unit hangar, N211, at NASA Ames.



NASA photos by Dominic Hart

