

Ames successfully tests Mars airplane prototype

Soaring gracefully down to Earth from a balloon floating 103,000 feet high above Oregon, a NASA prototype of an airplane that someday may fly over Mars successfully completed a high-altitude flight test on Aug. 9.

Conducted at Oregon's Tillamook airport by the Kitty Hawk 3 project at Ames, the test was designed to validate the aerodynamic performance of the prototype. Nicknamed 'Orville' after one of the famed Wright brothers who first flew on Dec. 17, 1903, the NASA 731 glider was dropped from a helium-filled balloon that towed it up to the 103,000-foot altitude – the highest ever for such a test -- before releasing it. Engineers and scientists hailed the test as a great success.

"It was a great flight and everything went really well. It appears that we realized all of our test objectives," exclaimed a jubilant Andy Gonzales, an Ames aerospace engineer who served as the flight test director. Low-altitude tests of NASA 729, another prototype called 'Wilbur,' were conducted last month at Ames.

"Mars has always fascinated people," said Larry Lemke, an aerospace engineer at Ames who serves as Ames' project manager for advanced Mars mobility concepts, which include airplanes as well as other systems. "Every time we send a mission up there, we come back with fascinating discoveries."

According to Lemke, a Mars airplane is an idea whose time has come. "The Mars airplane is an idea that has been around for about 25 years, and over the past five years or so, it has been growing in popularity," he said. "I think a Mars airplane will play a role in exploring the Red Planet."

Conventional in appearance, the Mars airplane concept developed by Ames engineers features a long, straight wing and twin tails in the rear. The remote-controlled glider tested in Oregon featured an approximately four-foot-long fuselage and an eight-foot wing span.

"The flying we have successfully completed in Oregon is very similar to the flying that we will be doing over Mars during a productive exploration mission," Lemke

said. "One unique aspect of flying a Mars mission with an airplane is that it must be constructed in a fold-up configuration in order to fit inside a spacecraft."

In its future configuration for Mars, the aircraft is expected to have its own propeller propulsion system capable of operating in the Mars atmosphere, which is comprised mostly of carbon dioxide. It will also carry a variety of sophisticated instruments to observe and conduct science experiments.

"The possibility of life on Mars is a very hot topic and an interesting question, so I'm sure you will find instruments on board that are designed to find signs of water on Mars, which is necessary for life," Lemke said.

"In addition, we would have a large array of cameras on the airplane to be able to see large areas of the Mars terrain in very high resolution," Lemke said. He said the cameras aboard the aircraft would be so precise, they could see objects on Mars as

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Kitty Hawk 3 (NASA 731) is shown being lifted airborne by a helium balloon in preparation for a recent flight test.

Project team is analyzing test data

Having designed, built and flown a glider prototype of an airplane that someday could be used to explore Mars, Ames' Kitty Hawk 3 project team members are now analyzing the wealth of data obtained from the flight tests of the prototype nicknamed Orville.

We're making some exciting discoveries about Orville's performance during its high-altitude tests in Tillamook, Ore. It is turning out to be a much better aircraft than even we expected. There is more untapped margin available and the Kitty Hawk 3 team is already planning a test to expand Orville's envelope. The next several months will be an interesting and exciting period in the development of future Mars flight capability.

Team members include Larry Lemke, Andy Gonzales, Cheryle Corpus and Bob Hogan of Ames' Code SF; Dave Hall and Bob Parks of David Hall Consulting (DHC);

Steve Tayman, Nandy Pizarro and Pete Chaplin of the Naval Research Laboratory (NRL); and Tim Lachenmeir, Bob Moody and several others from Global Solutions for Science and Learning (GSSL).

During a one-year period preceding the flight tests, the team designed and built two prototypes. Final testing occurred during an intense two-week period beginning on Monday, July 30 at Moffett Field, and culminating on Thursday, Aug. 9 at Tillamook Airport, Ore. Both aircraft are gliders measuring approximately 4-1/2 feet long with 8-foot wingspans. NASA 729, 'Wilbur,' was the pathfinder aircraft and was tested several times after being dropped from a powered 'mothership' - NASA 720. NASA 731, 'Orville,' was designated for testing at an altitude of more than 100,000 feet to simulate flying conditions on Mars.

The activity started on Monday, July 30.

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Center Briefs

Astronomers find Jupiter-sized planet orbiting star in Big Dipper

A team of astronomers has found a Jupiter-sized planet orbiting a faint nearby star similar to our sun, raising intriguing prospects of finding a solar system like our own.

The planet is the second found orbiting the star 47 Ursae Majoris in the Big Dipper, also known as Ursa Major or the Big Bear. The new planet is at least three-fourths the mass of Jupiter and orbits the star at a distance that, in our solar system, would place it beyond Mars but within the orbit of Jupiter.

"Astronomers have detected evidence of more than 70 extrasolar planets," said Morris Aizenman, a senior science advisor at the National Science Foundation. "Each discovery brings us closer to determining whether other planetary systems have features like those of our own."

Astronomers go behind the Milky Way to solve X-ray mystery

Through layers of gas and dust that stretch for more than 30,000 light-years, astronomers using NASA's Chandra X-ray Observatory have taken a long, hard look at the plane of the Milky Way galaxy and found that its X-ray glow comes from hot and diffuse gas. The findings, published in the Aug. 10 issue of the journal *Science*, help to settle a long-standing mystery about the source of the X-ray emission from the galactic plane.

Scientists have debated whether the Milky Way plane's X-ray emission was diffuse light or from individual stars. Armed with Chandra, an international team led Dr. Ken Ebisawa of NASA's Goddard Space Flight Center, Greenbelt, Md., zoomed in on a tiny region of the galactic plane in the constellation Scutum.

"The point sources we saw in the galactic plane were actually active galaxies with bright cores millions of light-years behind our galaxy," said Ebisawa. "The number of these sources is consistent with the expected number of extragalactic sources in the background sky. We saw few additional point sources within our galaxy."

Galileo flyby reveals Callisto's bizarre landscape

A spiky landscape of bright ice and dark dust shows signs of slow but active erosion on the surface of Jupiter's moon Callisto in new images from NASA's Galileo spacecraft.

The pictures taken by Galileo's camera on May 25 from a distance of less than 138 kilometers, or about 86 miles, above Callisto's surface give the highest resolution view ever seen of any of Jupiter's moons.

"We haven't seen terrain like this before. It looks like erosion is still going on, which is pretty surprising," said James Klemaszewski of Academic Research Lab, Phoenix, Ariz. Klemaszewski is processing and analyzing the Galileo Callisto imagery with Dr. David A. Williams and Dr. Ronald Greeley of Arizona State University, Tempe.

U.S. Olympic committee visits Ames



photo by Dominic Hart

The Bay Area Sports Organizing Committee (BASOC) for the 2012 Olympics visited Ames on Aug. 21 and examined Hangar 3's potential as an International Broadcast Center. Also present were members of the United States Olympic Site Selection Committee.

Ames supports 'newsroom' for STS-105

Ames news chief Ann Hutchison and public affairs officer Victoria Kushnir recently traveled to the Johnson Space Center in Houston, Texas to support the STS-105 mission of the space shuttle Discovery to the International Space Station. Both worked in the JSC newsroom, responding to inquiries from news media covering the mission. STS-105 delivered the Expedition Three crew of Commander Frank Culbertson and flight engineers Vladimir Dezhurov and Mikhail Tyurin to the ISS. Discovery also brought the Expedition Two

crew (Commander Yuri Usachev and flight engineers Susan Helms and Jim Voss) back to Earth after more than 5 months on the ISS. Discovery carried the Leonardo Multi-



Ames news chief Ann Hutchison (right) and public affairs officer Victoria Kushnir (left) share a light moment in the JSC newsroom during the recent shuttle mission.



Ames public affairs officer Victoria Kushnir and space shuttle mission commentator James Hartsfield in the Mission Control Center at the Johnson Space Center during the STS-105 Discovery mission to the International Space Station.

Purpose Logistics Module, which contained equipment and supplies for the Expedition Three crew, to the station.

Astrobiology Academy inspires future leaders

This summer's Ames Astrobiology Academy continued the rich tradition of partnering some of the brightest, most promising college students from around the country with well known Ames scientists and researchers in the Earth, space and life sciences. During this unique 10-week program, students became research associates tackling the profundities of astrobiology, the study of the living universe.

According to David Morrison, senior scientist for the NASA Astrobiology Institute (NAI), one of the Academy's sponsors, "The Astrobiology Academy is a remarkably successful initiative that provides exceptional, highly motivated students with a unique opportunity to work with scientists on the cutting edge, while at the same time learning from each other and from their experiences in the NASA culture." These future leaders of the U.S. space program excel in both the classroom and the community. They are exposed to NASA's operations, missions, technology and talent. While discovering what makes NASA tick, each student learns how his/her own talents and interests fit into the astrobiology mission.

A unique aspect of the Astrobiology Academy is its holistic approach. Students are exposed to astrobiology-related themes during multidisciplinary academic lectures and field trips. Networking opportunities are built into these activities. A group project, teambuilding exercises and recreational activities enrich student leadership and social skills.

Key to the whole endeavor is the close working relationship each student enjoys with his/her principal investigator (PI) mentor. This shoulder-to-shoulder approach contributes significantly to their ultimate career development. Students participate in an independent lab-based project under the direction of a NASA scientist or researcher with whom they are partnered. "The success of the Ames Astrobiology Academy would not be possible without the scholarship and mentorship of the dedicated PIs who afford a hands-on approach in the trenches of astrobiology research," Morrison stated proudly.

These sentiments are echoed by the students, who credit the collaborative relationship with their mentors as a special and significant component of the Academy. "I'm impressed by the extent to which the PIs

support the program as a whole and by their investment of time and energy to mentoring us individually," said Gabriel

done and ran subjects through his studies more efficiently. "These students are so smart. They provide motivation and have tremendous energy and have good ideas that I hadn't thought of before, helping to stimulate research," he said.

And he, along with many other of the PI mentors such as long-time Academy supporter Peter Jenniskens of the Exobiology Branch, track the progress of their past students as if proud parents. He recounts, "All of my students are doing extremely well. One is pursuing a masters degree at Stanford. Another is working at his dream job at Kennedy Space Center."

If the Ames Astrobiology Academy alumni are any indication, the Academy class of 2001 is sure to succeed. Since its inception five years ago, the young men and women of previous academies can boast some impressive academic and professional accomplishments. More than half have

gone on to pursue higher degrees or are working at NASA or private industry in fields related to space and astrobiology. Publications have resulted from student research during the Academy summer. Some have gone on to international collaborations.

Past and present Ames Astrobiology Academy students owe their academic and career successes in large part to the dedicated PI mentors who give unselfishly of their time and talent. Today's PIs serve as role models to future U.S. space program and astrobiology leaders who will someday find themselves in a mentoring role. This is what makes the Academy a success year after year.

This year's Academy PI mentors, along with their college students, included:

Dr. William Borucki and Laura Parker; Dr. Richard Boyle and Gabriel Hoffman; Dr. Natalie Cabrol and David Fike and Rachel Schelble; Dr. David Des Marais and Tom Duster; Paul Espinosa and Emma Samelson-Jones; Dr. Gerard Heyenga and Jon Pineau; Dr. Peter Jenniskens and Emily Schaller; James Phoreman and David Galvan; Dr. Peter Pilewskie and Sam Clanton; Dr. April Ronca and Christopher May; Dr. David Summers and Paul Blainey; and Dr. Robert Welch and Anna Lee Strachen.

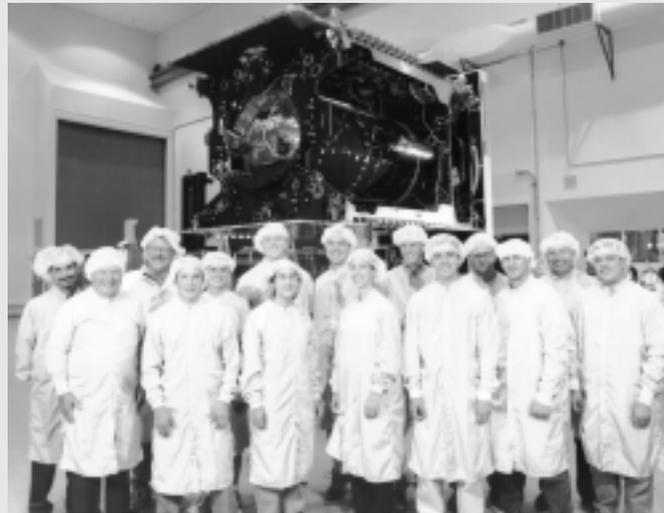


photo by Sergio Maraschin

Ames Astrobiology Academy students and staff during a private industry field trip to Space Systems Loral.

Hoffman, who was partnered with first-time Academy PI mentor Richard Boyle, director of the Center for Bioinformatics. Other students commented that this support, coupled with learning and developing basic scientific capabilities, provided practical skills and real-world experience with which to launch their astrobiology careers.

David Des Marais of the Exobiology Branch and long-time Academy supporter finds that the students are interested in, and serious about, the subject matter and often have the ability to "jump right in." He appreciates that he, and the other mentors, are helping to shape the next generation of scientists/researchers and to enable them to solve complex scientific problems.

First-time astrobiology PI mentor Nathalie Cabrol of the Planetary Systems Branch found her student to be "bright, highly professional and extremely dedicated to his project." So much so, that she ensured he would be present at the upcoming 2003 Mars landing site selection workshop in New York to support the Ames site proposals on which he was a team member. Cabrol feels that "being able to mentor a young adult is always a privilege."

Robert Welch of the Human Information Management Research Branch, a frequent Academy PI mentor, said his Astrobiology Academy students got more research

BY PAMELA DAVOREN



Events & Visits

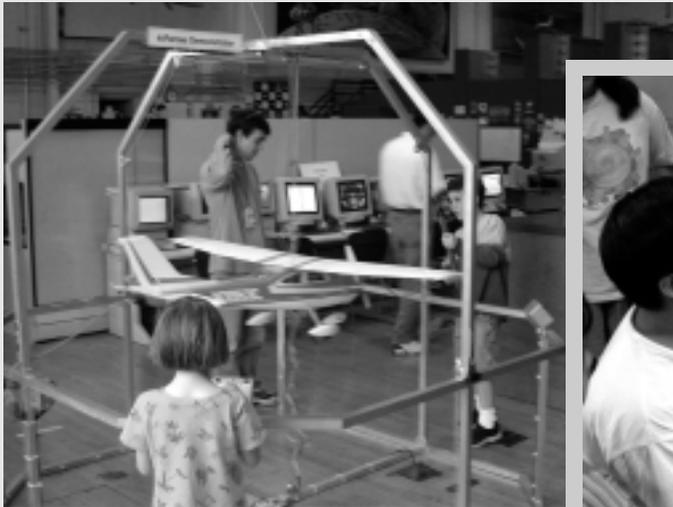
AAE hosts Employee Day

On July 31, 11 docents and two staff members of the Ames Aerospace Encounter (AAE) hosted the 14th Ames Employee Day at the educational facility.

Attendees were able to see the kinds of hands-on learning stations and materials available to kids in grades 4 through 6, and view the new Aeronautics Education Laboratory. Over 200 adults and children, representing over 33 codes and departments from Ames and Moffett resident agencies, attended.



Ames Aerospace Encounter docent Peter Perham explains the orbital chair to two Ames Employee Day visitors.



Visitors explore the forces on an airplane and the aircraft control surfaces using the 4-Forces Demonstrator.



Students fly the flight simulator in the new Aeronautics Education Laboratory located at the Encounter.

photos by Tom Trower



Author James Fallows visits Ames and Space Camp

James Fallows, a nationally recognized journalist (Atlantic Monthly, National Public Radio), visited Space Camp on Aug. 16 to meet and speak informally with NASA/

FAA personnel about his new book "Free Flight: From Airline Hell to a New Age of Travel." This was a Commonwealth Club/Silicon Valley event, co-sponsored by the

Computer Museum History Center (CMHS) and the Friends of the California Air and Space Center.



Author James Fallows (left) speaks with John Zuk of Code APT (center) and Don Reynolds of Code JFP (right) on Aug. 16 at Space Camp while signing his latest book, "Free Flight: From Airline Hell to a New Age of Travel."

photos by Jonas Diño



Author James Fallows speaking at Space Camp on Aug. 16.

Education Associates tour Ames' rotorcraft facilities

On Aug. 10, the Rotorcraft Division (Code ARH) took interns on a tour of the facilities that support the flight research division's mission. The tour was arranged by the Education Associates Program (EdAP).

Jessica Jenkins, an education associate working on a Code ARH project to optimize the control systems of the new Sikorsky S-92 civil helicopter, conducted the tour.

The tour began at the Army Flight Projects Office hangar, where the students were shown the four rotorcraft and two unmanned aerial vehicles (UAVs) that support joint Army/NASA flight research at Ames.

The first vehicle discussed was the Rotorcraft Aircrew Systems Concepts Airborne Laboratory (RASCAL) JUH-60A. RASCAL is a UH-60 Blackhawk helicopter that has been modified by NASA and the US Army for airborne flight systems research utilizing a full-authority, high-bandwidth fly-by-wire, flight control system. According to Jenkins and Maj. David Arterburn, one of the RASCAL project pilots and chief of the Flight Projects Office, the RASCAL aircraft is a one-of-a-kind national asset that can be used for the development of advanced flight-control laws for manned or unmanned rotorcraft or V/STOL aircraft.

One such application is the development of advanced control laws to improve handling qualities in degraded visual environments (DVEs), such as flight with night



Major David Arterburn discusses the RASCAL aircraft with the Education Associate students during their tour of Ames.

vision goggles (NVGs). The UH-60A was designed and built in the 1970s for operation in daylight and instrument conditions when night missions were rare. The integration and use of NVGs has increased dramatically over the last 15-20 years without any improvement in handling qualities from the original aircraft design. Code ARH has

developed numerous control law strategies for improving handling qualities in DVE utilizing the Vertical Motion Simulator, but has not had the opportunity to integrate these strategies into a flight vehicle until now.

The students also saw the NAH-1S Cobra operated by the Army Flight Projects Office. Code ARH recently completed testing of the panoramic night vision goggles (PNVGs) on the Cobra. The PNVGs were developed based on research conducted by Code ARH that demonstrated a dramatic improvement in pilot performance when field of view was increased from 40 degrees (typical of current NVGs) to more than 80 degrees. The PNVGs were built with a 100-degree field of view.

Another tour stop was the Autonomous Rotorcraft Project (ARP). Two nine-foot Yamaha RMAX radio-controlled helicopters are involved in a study to develop intelligent decision-making for an autonomous rotorcraft, an idea that may have numerous applications.

The ultimate goal is to enable high-level tasks to be performed by the craft, via enhanced software-enabled control (SEC), including such missions as search and rescue operations or autonomous operation of a rotorcraft or other flight vehicle to investigate landing sites on the surface of Mars. According to major Arterburn, such autonomous rotorcraft could gather data not only by autonomous waypoint navigation, but by making independent decisions about when to land, what to explore and how to take care of its system needs (battery recharging) based upon a specified mission requirement, all without the need of real-time input from a human operator.

The interns were also able to tour the Vertical Motion Simulator (VMS), in which tilt-rotor simulations were being conducted. The six-degree-of-freedom VMS, with its 60-foot vertical and 40-foot lateral motion capability, is the world's largest motion-

base simulator. The VMS was designed to evaluate a wide variety of flight vehicles, ranging from helicopters to high-speed air-



Education Associate students gathered in front of Building N-200 in preparation for their tour on Aug. 10.

photos by Julia Kochuev

craft, for instances where large translational accelerations are important for piloted control. Recent projects have included the V-22 Osprey tilt-rotor, both versions of the Joint Strike Fighter, and the space shuttle for crew training prior to each launch.

The interns are hired through the Education Associates Program, a cooperative space grant education program, hosted by Ames and administered by the University of California Extension, Santa Cruz. This summer, the Education Associates Program has employed over 100 interns working in nine of the 14 organization codes, and contributing significantly to many research projects at Ames.

The program is a simple and effective way of linking students and professors to projects at Ames, offering flexibility and cost-effectiveness in its administration. Additional information and online forms can be found at the program's web site at: <http://edassoc.arc.nasa.gov>. Carol Roland, the U.C.S.C administrator on base, is available to provide assistance. She can be reached at ext. 4-2987 or via email at: eaprogram@mail.arc.nasa.gov.

BY JULIA KOCHUEV 

Ames successfully tests Mars airplane prototype

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small as the size of a quarter. "I think the images will be stunning," he said. "During a Mars airplane mission, we will be able to view the planet at very close proximity and this will convey to the public that there is a real planet there, not just an abstract."

"Our test flight at Tillamook airport showed the airplane's flight was very smooth and stable, which makes for a good platform for science instruments," said Gonzales.

Ames engineers predict the next few years will be challenging, as they prepare for a potential mission to Mars. "We will be expanding the envelope and developing a much more complex aircraft for exploring Mars," Lemke said. The next step will be to develop a Mars airplane model with folding wings and, later, one with a propeller propulsion system.

BY MICHAEL MEWHINNEY



photo by Dominic Hart

NASA 729, Wilbur, the low-altitude twin to NASA 731, Orville, is taken aloft for a 1,000-foot test flight to check its handling qualities.

Project team is analyzing test data

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By Tuesday, team members debugged several radio link problems that had surfaced in previous weeks and enabled the team to proceed with testing at Moffett Field. Wilbur behaved nicely, as it had in previous practice tests. However, Orville was not cooperating--its radios interfered with the radio controls of the mothership. A valuable test day was lost shielding NASA 720's radios and disconnecting non-essential radios on NASA 731.

Finally, on Friday evening, a critical low-altitude flight test of Orville was attempted. The purpose of the test was to verify the performance of Orville's systems and software. The pressure was on. The team was scheduled to pack on Saturday and travel to Tillamook on Sunday. However, once again, problems surfaced when team members discovered that the mothership's engine was not powerful enough to lift Orville to a safe drop height. Orville was simply too heavy and too "draggy." Finally, the team conducted an "off-nominal" landing of the 720 / 731. Although Orville came out unscathed, the mothership suffered some landing gear damage.

The team debriefed over dinner and decided to continue with plans to deploy to Tillamook and complete the low-altitude flight test there before attempting the as-

cent to more than 100,000 feet. The team packed on Saturday and rendezvoused at Tillamook on Sunday evening.

On Monday, Aug. 6, the team split up



photo by Andy Gonzales

Ames Kitty Hawk 3's ground crew pauses during balloon integration checkout. Left to right, Dave Hall, DHC; and Cheryl Corpus and Larry Lemke, both of Ames.

and worked on parallel efforts to prepare Orville for testing and re-engine and repair NASA 720. GSSL also began final preparations of a helium balloon that would tow Orville up to an altitude in excess of 100,000

feet. By Tuesday, we were ready for the "dress rehearsals" of Orville integrated with the balloon, followed by a low-altitude flight test. Once again, the team was stymied by a balky battery on Orville and some minor video problems. This was certainly a low point in the test preparation. Wednesday was the busiest day, as the team successfully isolated and repaired the problems and then performed two dress rehearsals and the low-altitude tests. The low-altitude test verified that the data system was working and pointed out the need for some minor trim changes. By 10 p.m., the changes had been made and the team adjourned to dinner. Most of the team did not see sleep until after midnight.

Early Thursday morning (4 a.m.), the team assembled at the blimp hangar at Tillamook Airport. This hangar was built at the same time as Hangar 1 at Moffett Field and like Hangar 1, housed coastal patrol blimps. The airport has a museum of flyable aircraft dating back to just after World War 1. Flight history literally hangs in the air.

By 5 a.m., we had loaded the final flight software; however, our data system was refusing to communicate. By 5:30 a.m., we had successfully brought the data system up. We encountered a slight weather de-

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Team is analyzing test data

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lay, but by 6 a.m., all of the flight hardware was integrated on the balloon launch pad. At 6:15 a.m., it became apparent that we would have a spectacular weather day. The sun was rising in mostly clear skies and the wind was calm. The clear skies and calm winds were projected to last the entire flight—estimated to be about 4-1/2 hours. At 6:35 a.m., the safeties were released on the balloon and Orville was in the hands of the ground crew. At 6:36 a.m., the balloon was released from the support van and the ground crew moved Orville underneath. The ground crew gently released their hold on Orville as the balloon lifted it out of their hands. It was at this moment we all realized that all of the preparations and problem solving of the previous year were over and that Orville was now on its own. There was nothing we could do that would change whatever result awaited Orville.

The ascent of Orville was majestic. We had the balloon and Orville in clear view for several minutes. Even as the balloon rose through 80,000 feet, expanding in the slight atmosphere and glinting in the bright Or-

beach is 3 miles to the west of Tillamook), about 30 miles down-range from the ground stations. The radios that had given us so many problems had to be working perfectly to give us good tracking and telemetry. As it turned out, we could not have picked a better set of weather conditions. The balloon and Orville never got more than 12 miles from us and stayed within the airspace cylinder of Tillamook Airport, an uncontrolled airport.

At 8:17 a.m., Orville was being towed up through 100,000 feet and the team decided that it was time for it to take wing. We were still not problem free, however, as it took three attempts to get the separation



Kitty Hawk 3 (NASA 731) flying on the 'edge of space.' This is a frame grab from a video camera onboard the Orville, NASA 731 test aircraft.

video signal, with a self-portrait sideview of Orville, was blocked due to the configuration of the antenna and the fuselage. The telemetry was still good and showed that Orville was approaching 0.8 Mach. Orville is not supposed to be a supersonic airplane! We did not want to see a speed over 0.7 Mach. It was pulling over 3-1/2 Gs-- it was only expected to pull about 2.

Suddenly, the video briefly came back and showed clear indications that the horizon was tilting in the appropriate direction and that Orville was pulling out of its dive. The team erupted in cheers as it became apparent that Orville was flying itself into a stable glide. Within two minutes after the release, we finally got full video back, showing Orville flying "apparently on the edge of space" with a beautiful black sky against a blue-white Earth. At this point, Orville was so close to the airport that it went into its pre-planned circling flight, under control of an autopilot. The flight was going so well that several team members began to pack up support equipment for the trip home.

As Orville descended to 10,000 ft., several team members were able to catch sun glints. By 7,500 feet, Orville was clearly in view. At about 1,500 feet, a pilot took manual control and landed the aircraft on a grass strip at 10:42 a.m. Orville's nose was damaged, but was considered repairable. The balky data system eventually gave up its historic record and the first-ever attempt to fly a Mars-like aircraft in Mars-like conditions had succeeded magnificently.

The success of this test was a credit to all team members involved. The problems that occurred were solved by the perseverance of a team that worked extremely well together.

BY ANDY GONZALES



photo by Cheryle Corpus

NASA 731, Orville, is prepared by Andy Gonzales, Kitty Hawk 3 project flight test director, for a low-altitude hop (1,000 ft.) at Ames to check out aircraft and data systems.

gon sun, we could clearly see the "bubble." Some team members using strong binoculars claimed they could see Orville.

Early weather projections had told us that Orville might be released from the balloon out over the Pacific Ocean (the

signal through. The backup would have been a timer that would have let Orville go at 115,000 feet, too high for our state of readiness. At 103,500 ft., at 8:20 a.m., the separation signal activated and Orville started its dive. At just this instant, the

NASA computer tool smooths flow of air traffic

Air traffic controllers will be able to make decisions about air traffic with greater accuracy thanks to a new NASA software tool.

Researchers at Ames recently monitored more than 1,000 take-offs, landings and overhead flights near Denver to test the En-route Data eXchange (EDX) tool. The tool allows for the 'real-time' delivery of flight data to automated air traffic management software, giving controllers the ability to predict aircraft position and avoid potential conflicts.

"The ability to accurately predict aircraft trajectories more than 20 minutes in advance is crucial to the success of air traffic management," according to Rich Coppenbarger, EDX technical lead. "EDX allows automation used for air traffic control decisions to be more accurate, thereby increasing fuel efficiency and system capacity, and reducing controller workload," he added.

EDX delivers 32 types of data from the plane to air traffic controllers, who are using

NASA's Center-TRACON (Terminal Radar Approach Control) Automation System, or CTAS. Some data, including aircraft speed, weight, flight plans and weather conditions, are processed immediately, and the rest are stored for later analysis.

"Field experience has shown that controllers must have confidence in the accuracy of underlying trajectory predictions in order to utilize our automation effectively. EDX provides that level of trust by providing a wealth of accurate and timely data," said Coppenbarger.

With cooperation from United Airlines, 48 Boeing 777 aircraft received EDX software upgrades. The 777 was chosen because of its state-of-the-art avionics and advanced handling of 'datalink' information.

The six-month test of EDX was conducted at the Denver Air-Route Traffic Control Center with the assistance of the Federal Aviation Administration (FAA), Washington, D.C.; Honeywell, Morristown, N.J.,

and United Airlines, Chicago.

The next step is evaluation of the tool's capabilities for future application to real-time flight plan development and modification. This capability can be viewed as an important step toward attaining Free Flight, which is a FAA program that will give pilots the freedom to choose their own flight paths in real time.

The tools within the CTAS suite are designed to help air traffic controllers manage the increasingly complex air traffic flows at large airports and en route. The tools in CTAS benefit air travelers by reducing delays while maintaining safety.

EDX is being developed under the Advanced Air Transportation Technologies (AATT) project, a part of NASA's Aviation Systems Capacity program led by Ames. Ames has been conducting air traffic control research and development since the mid-1980s.

BY JONAS DIÑO 

New format planned for annual safety street fair

The sixth annual Ames Safety and Quality Week Street Fair and Chili Cook-Off will have a new look this year. As in the past, there will be safety and environmental vendor booths, plenty of hot chili and great music. The difference is, this year's event will have a new look and feel and will mark the beginning of a new tradition.

Durand Road will look and feel cooler because there will be temporary sun screens over part of the area. This will provide greater comfort to the participants as we all enjoy the traditional chili cook-off activities. The new offering will be the First Annual Ames Safety Bowl. This has been a big success at other NASA centers but has not been presented at Ames until now. A professional master of ceremonies will lead teams from each directorate through a fast-paced series of 'Safety Jeopardy' competi-

tions. The teams have already been assembled by the Voluntary Protection Program (VPP) leads and are preparing for the actual competition on Sept. 26.

While the usual chili tasting and judging are underway, we will be treated to a little magic from Michael Stroud (AKA "Magic Mike") followed by the Jeopardy game show action. Contestants will answer questions about safety, health, quality and environmental protection and the team from the directorate with the most right answers will win the beautiful first place award. Trial runs of this contest show real potential for lots of laughs as well as intense competition. Make your plans now to come out and enjoy the action, food and fun beginning at 11:30 a.m. on Wednesday, Sept. 26. Support your Jeopardy team and vote for your favorite chili.



As always, Safety and Quality Week will feature lots of training opportunities as well as excellent speakers and the Fall Fun Run and Walk. For more information, go to <http://www.q.arc.nasa.gov> or contact Jack Stanley at: jstanley@mail.arc.nasa.gov or call him at ext. 4-4242.

Ames reaches out to minority news media

The Communication Office (Public Affairs) is planning to celebrate Hispanic Heritage Month in September by sponsoring a special minority news media outreach event. This will give reporters from Telemundo, Univision, CNN Español and other Spanish-language media organizations the opportunity to tour Ames facilities and meet members of Ames' distinguished and accomplished Hispanic community. The event date is being negotiated.

Media representatives will speak with

Ames scientists and managers who will share their experiences of working at NASA and discuss the contributions made by the Hispanic community to space research and technology development.

This event is one of a series designed to reach out to news media outlets that serve diverse, minority, non-traditional and underrepresented markets and communities, which comprise a significant percentage of the San Francisco Bay area population. NASA and Ames are determined to

ensure that America's national space program involves, represents and is accessible to all citizens. To that end, the agency and the center are committed to breaking down the traditional barriers — language, socio-economic and cultural, among others — that prevent universal access and participation.

For more information, or to volunteer to take part in this media outreach event, contact Victoria Kushnir at ext. 4-0176 or e-mail her at: vkushnir@mail.arc.nasa.gov

Conservation & Training

Energy conservation at work and home

On July 31, PG&E's public affairs specialist Teresa Alvarado and Ames' Plant Engineering Branch chief Steve Frankel of Code JFP discussed the history of the energy crisis, how it has impacted our lives at home and work and what we can do to conserve energy.



photo by Phil Ting

Teresa Alvarado of PG&E (left) with Ames' Plant Engineering Branch chief, Steve Frankel.

Due to a supply and demand imbalance, unsteady costs on the wholesale power market and a rise in the costs associated with creating electricity, Californians are feeling the energy crisis hit at home and at work.

Ames currently obtains its electricity from the Western Area Power Administration

(WAPA) and Pacific Gas and Electric (PG&E). Natural gas is purchased from the Defense Energy Service Center (DESC). Compared



to last year, natural gas has market prices higher by 400 percent, and the electricity wholesale price has escalated up to 300 percent. Ames has had to curtail power consumption for wind tunnels, and staff are reducing lighting and other energy use.

Existing programs at Ames include: Facility Management Control System (FMCS) that controls building HVAC systems; energy audits; energy efficient re-lamping; preventive maintenance on HVAC systems; design review for energy conservation; design standards for energy conservation and alternative financing programs, such as the Energy Saving Performance Contract (ESPC) and the Ames/Palo Alto Solar Electric Project on the roof of building 245.

In the future, Ames' goal is to develop

programs to repair and/or replace energy-inefficient HVAC systems, increase cooling system setpoints, reduce heating system setpoints and provide effective wind and solar systems for peak demand shaving.

What can you do at work?

- When not in use, turn off lights, computers and printers
- Reduce run schedules
- Close windows and doors
- Shut off and/or eliminate coffee makers and space heaters.
- Go to <http://jf.arc.nasa.gov/energy/index.html>

What can you do at home?

- Install energy-efficient products (Look for the Energy Star label).
- Unplug and recycle your second refrigerator.
- Do only full loads when using the clothes washer and dryer.
- Replace existing lamps with sub-compact fluorescent lamps.
- Visit: <http://www.pge.com/123/> for energy-saving ideas and information on rebates and incentives.

The Environmental Services Office hosts brown-bag presentations that take place quarterly on environmentally related issues.

If you have questions, contact the author at ext. 4-6810 or you can email her at: jquanz@mail.arc.nasa.gov.

BY JULIE QUANZ



Sign-ups for NASA-STARS resume preparation training classes scheduled

Resume writing training classes for the NASA **S**taffing **A**nd **R**ecruitment **S**ystem (NASA-STARS) are currently being offered for all resident staff. The sessions are aimed at assisting employees in preparing a 'whole person' resume. The class will provide tips and techniques on how to write an effective resume for an automated system, focusing on skills and accomplishments as they relate to career goals.

There will be two versions of the class. The first version is the full resume preparation class with computer workstations for the attendees to have hands-on computer practice with the NASA Resume Builder. This version will include an exercise in skills analysis for career planning and resume writing. The second is a shorter version of the resume preparation class with a demonstration of the Resume Builder. Both classes

will place emphasis on how to write an effective resume. The dates, times and locations are as follows:

Classes available with hands-on computer practice:

- Sept. 6, 9 a.m. - 12 p.m., MTCC/north wing
- Sept. 12, 9 a.m. - 12 p.m., MTCC/North Wing
- Sept. 18, 1 p.m. - 4 p.m., MTCC/North Wing
- Oct. 24, 9 a.m. - 12 p.m., Bldg. 241, Rm 149
- Oct. 25, 9 a.m. - 12 p.m., Bldg. 241, Rm 149
- Oct. 30, 9 a.m. - 12 p.m., Bldg. 241, Rm 149

Classes available with demonstration only:

- Sept. 25, 8 a.m. - 9:30 a.m., Bldg. 233, Room 172
- Sept. 25, 10 a.m. - 11:30 a.m., Bldg. 233, Rm 172
- Sept. 25, 1:30 p.m. - 3 p.m., Bldg. 233, Rm 172
- Sept. 26, 9 a.m. - 10:30 a.m., Bldg. 233, Rm 172

Employees who wish to attend must complete an ARC 301 Training Application (current version) and indicate the date and time of the session you would like to attend. Mail the form to Barbara Chenier at M/S 241-3. There is no cost to attend the resume training class.

Meteorite yields clues to carbon's evolution

Dr. George Cooper, a researcher in Code SSX, was part of a research team studying the new Tagish Lake meteorite, a primitive meteorite whose patterns of organic compounds are different from those found in other carbon-type meteorites.

Cooper co-authored a paper on the subject published in the journal *Science Express* on Aug. 24, titled "The Organic Content of the Tagish Lake Meteorite."

"The odd thing was the near absence of amino acids which are found in similar meteorites," Cooper said.

One unusual pattern the team discovered was that the carboxylic and amino acids in the meteorite showed an abundance of the 'small' members of each group compared to other carbonaceous meteorites, such as the well-known Murchison meteorite. "We don't yet know what to

make of this finding. More samples will have to be studied," said Cooper.

The Murchison meteorite is a famous carbonaceous meteorite found in Australia in 1969 that contains numerous amino acids and a variety of other organic compounds thought to have played a role in the origin of life.

"The Tagish Lake meteorite is very difficult for the geochemists to categorize," Cooper added. "It doesn't fit the established categories."

The Tagish Lake meteorite, one of the most primitive solar system materials ever studied, contains carbon materials the same age as the Earth. It is a rare, carbon-rich meteorite classified as a "carbonaceous chondrite" meteorite. It fell on a frozen Canadian lake in January 2000 and is the most pristine and 'clean' specimen ever



studied of this type of space object. Carbonaceous chondrite meteorites contain vital clues about the evolution of carbon compounds in the solar system before life began.

The meteorite analysis was conducted by a team headed by Dr. Sandra Pizzarello, *continued on back page*

San José High school repeats as national robotics champion

A San José 'continuation' high school team has won a national robotics competition for the second year in a row, this time in Seattle.



The winners, Foothill High School Botball team, with their trophies.

On Aug. 8, Foothill High School's Botball team won the 2001 National Botball Tournament at the American Association of Artificial Intelligence conference. Botball is a robotics sport for which students construct and compete autonomous LEGO robots that manipulate objects on a tabletop.

"Here we have the kids that society expects the worst of, and they give us their absolute best," said mentor Alan Federman, an engineer at Ames. "I am very proud of this school. Nobody has ever previously won two consecutive national robotics contests," he said. Last year, Foothill students were leaders of the championship alliance of the 2000 FIRST Robotics Tournament in Orlando, Fla. In the Orlando contest, stu-

dents constructed a large, remote-control robot entirely different from this year's Botball model.

"After that Foothill win in 2000, a lot of people thought it was a fluke, something that could never happen again in a million years," Federman said.

Foothill's students, mostly of Hispanic or Asian heritage, sometimes are classified as 'youth at risk.' For the robotics work, they must understand basic principals of engineering and computer programming.

Foothill teacher Jeneva Westendorf assisted the student team. NASA Ames engineer Terry Grant mentored team members. In addition, former NASA engineer Jeff Ota, a member of the East Side Union District High School board, was involved in the project.

Forty-seven student teams from across the nation competed in this year's Botball tournament in Seattle. Three other schools from the East Side Union High School District in San José also took part and did well



photos by Dominic Hart

Foothill High School supervisor shown fulfilling his promise which was, if the students won the competition this year, they could shave his head!

in this year's competition. These schools are Andrew Hill High School, Overfelt High School and Independence High School.

The NASA Robotics Education Project assists students in learning engineering and computer skills by supporting the Botball competition and other educational robotics activities.

Additional information is available on the Internet at: <http://robotics.nasa.gov> and at: <http://www.kipr.org>

BY JOHN BLUCK 

Calendar & Classifieds

Event Calendar

Model HO/HON3 Railroad Train Club at Moffett Field in Bldg. 126, across from the south end of Hangar One. Work nights are usually Friday nights, 7:30 p.m. to 9:30 p.m. Play time is Sundays, 2 p.m. to 4 p.m. Call John Donovan (408) 735-4954 (W) or (408) 281-2899 (H).

Jetstream Toastmasters, Mondays, 12 noon to 1 p.m., N-269/Rm. 179. Guests welcome. POC: Samson Cheung at ext. 4-2875 or Lich Tran at ext. 4-5997.

Ames Bowling League, starts September 4. Bowling at the Palo Alto Bowl on Tuesday nights. We are looking for full-time bowlers to fill out our teams and substitute bowlers as well. Pre-league meeting at Palo Alto Bowl on Tuesday, August 28 at 6 p.m. Questions about the league or wish to sign up, contact Mike Liu at ext. 4-1132.

Ames Diabetics (AAD), 1st & 3rd Weds, 12 to 1 p.m., at Ames Mega Bites, Sun rm. Support group discusses news affecting diabetics. POC: Bob Mohlenhoff, ext. 4-2523/email at: bmohlenhoff@mail.arc.nasa.gov.

Ames Child Care Center Board of Directors Mtg, Every other Thursday (check website for meeting dates: <http://acc.arc.nasa.gov>), 12 noon to 2 p.m., N-269, Rm. 201. POC: Joan Walton, ext 4-2005.

Ames Sailing Club Mtg, second Thursday each month, 11:30 a.m. to 1 p.m., bldg. N262/Rm 100. Brown bag lunch, informal mtg usually includes a special speaker. Come learn about sailing. Everyone welcome; you do not have to be a member to attend. POC: Stan Phillips, ext. 4-3530 or Joyce Barrett ext 4-3816.

Ames Contractor Council Mtg, Sep 5, 11 a.m., N-200, Comm. Rm. POC: Paul Chaplin at ext. 4-3262.

Environmental, Health and Safety Monthly Information Forum, Sep 6, 8:30 a.m. to 9:30 a.m., Bldg. 19/Rm 1040. URL: <http://q.arc.nasa.gov/qe/events/EHSeries/> POC: Julie Quanz at ext. 4-6810.

Nat'l Association of Retired Federal Employees (NARFE), Sept 7, S. J. Chapter # 50 mtg, 9:30 a.m., Hometown Buffett, Westgate Mall, 4735 Hamilton Avenue,

Pan José. Lunch at 11 a.m. \$6.27 pp. Sept: Staff from office of Rep's Lofgren's and Honda's. POC: Earl Keener (408) 241-4459 or NARFE 1-800-627-3394.

NATO-RTO lecture series at Ames on "Error Estimation and Solution-Adaptive Discretization in Computational Fluid Dynamics," Sept 10 - 14. **Registration info at:** <http://www.nas.nasa.gov/NATO-RTO>. For more information, send an e-mail to: miedmond@mail.arc.nasa.gov

Ames Federal Employees Union (AFEU) general meeting, Sept 19, 12 p.m. to 1 p.m., Bldg. 19, Rm 1042. Guests welcome. Info at: <http://www.afeu.org>. POC: Marianne Mosher at ext. 4-4055.

Ames Amateur Radio Club, Sept 20, 12 noon, N-T28 (across from N-255). POC: Michael Wright, KG6BFK, at ext. 4-6262. URL: <http://hamradio.arc.nasa.gov>

Native American Advisory Committee mtg, Sep 25, 12 noon to 1 p.m., Building 19, Rm 1096. POC: Mike Liu at ext. 4-1132.

Ames Classifieds

Ads for the next issue should be sent to astrogram@mail.arc.nasa.gov by the Monday following publication of the present issue and must be resubmitted for each issue. Ads must involve personal needs or items; (no commercial/third-party ads) and will run on 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 & found ads only. Due to the volume of material received, we are unable to verify the accuracy of the statements made in the ads.

Housing

3 bd/1.5 ba, 2-story twtnhs on Luz Avenue, San José. Freshly painted inside, dishwasher, gas heat, w/w carpet, outside child play area/large patio. 1 car port. Easy access to H101/680/280. \$285K. Azucena (408) 559-2881.

For rent: 2bd/1ba garden cottage in La Honda, ~1/3 acre fenced yard, 1 car carport, detached storage, washer, dryer, refrig, cat/dog ok. \$1,800/mo plus dep. Available after October 1. Call (415) 241-0200.

3bd/2ba 1,700 sq.ft. Yr. 2000 Mnfrctd. home right off Shoreline (5 min commute or 15 min walk to/from Moffett Field). Grmt. ktchn. w/bay windows. Mrbl. frplc. Huge Mstr. bd. and bthrm. w/jczz. Cntrl. A/C and heating. Lots of amenities. \$185K. James (650) 428-0123

Miscellaneous

Jenn-Air Radiant range w/convection and full electric controls -- Model FCE 70610. White w/black top, self cleaning, exc cond. Asking \$450. Call (408) 249-7612.

Kitchen Aid Superba No Frost Refrigerator w/auto ice-maker, wine rack, adjustable glass shelves and bins, and crispier w/humidity control. Excellent condition. Asking \$350. Call (408) 249-7612.

Space Art from Kim Poors Gallery. Collectable and numbered prints. Professionally matted and framed. Call to see collection. Shirley (408) 777-8048.

Accepting new scouts for Bear Den #7, who are willing to accept responsibility and leadership roles as they gain in age, rank and experience. Candidates should be from Mountain View area, and entering the 3rd grade in the Fall. For information on joining, contact the Den 7 Cub Scout Leader, Ted Marcopolus at (650) 960-4025.

New roof shingles: Pabco Premiere 40-year composition, Color: Weathered Wood, 6 bundles (150 sqft) \$25, 408.295.2160.

PC scanner, Scanport SQ300 parallel port, flatbed, 300dpi/600dpi, 36bit color, for win95/98/NT, works fine, inc software & cables, \$20. Call (408) 295-2160.

San Francisco Opera -- single ticket. All Saturday 8 p.m. shows (3-4 hrs long). One-hour opera talk before show time (except 6/8/02). Shows: 9/29/01 Rigoletto; 11/03/01 Tosca; 12/01/01 Jenufa; 01/19/02 Merry Widow; 06/08/02 Carmen; 06/29/02 Guilio Cesare. Upper balcony single seat, \$25/tkt. LiuHsinMei@aol.com.

Fall Babe Ruth signups. Two 13-15 year-old Babe Ruth teams, open to residents of Los Altos, Mtn View, S'vale, Santa Clara & Cupertino. Games at Palo Alto Baylands against teams from Palo Alto & San Mateo, Sept 15 - Nov 15. Call (650)793-0770 or email WCMurphy@aol.com.

Ames Retirements

Name	Code	Date
Trevor W. Eisenman	FES	07-03-01
Philip M. Facciola	JFP	07-27-01
Robert W. Jackson	SFE	08-01-01
James C. Gonsalves	JFS	08-30-01

Safety and Quality Week scheduled for September 24 thru 28

-- includes Safety Stand-Down Day, Chili Cook-off and much more. Training classes offered all week. POC for the events is jstanley@mail.arc.nasa.gov, ext. 4-4242. Environmental, health and safety monthly information forum at: <http://q.arc.nasa.gov/qe/events/EHSeries/>

Transportation

'70 VW convertible classic, original owner, no smog needed; transmission ok; needs work on top & possibly engine. \$1,600. Esther or Art (650) 961-2732.

'89 Dodge Spirit ES V-6 Auto 35K on new engine. Original owner, \$25,00. Betsy (650) 906-9872.

'95 Ford Ranger XLT ext cab, Automatic, 3.0 V-6. Excellent condition. 1 owner with complete service records. Sport seats, AC, cruise, pwr mirrors, bedliner. \$7800. Call Steve tues-thurs. (650) 966-1206 or fri-mon. Call (831) 648-1423.

Lost & Found

Moffett Field Lost and Found may be reached at ext. 4-5416 at any time. Residents and employees at Ames may also use Internet browser at: <http://ccf.arc.nasa.gov/codejp/pages/lostFound.html> to view a list of found property and obtain specific instructions for reporting lost or found property and how to recover found property. Call Moffett Field security police investigations section at ext. 4-1359 or email at: mfine@mail.arc.nasa.gov.

Astrogram deadlines

All Ames employees are invited to submit articles relating to Ames projects and activities for publication in the *Astrogram*. When submitting stories or ads for publication, submit your material, along with any questions, in MS word by e-mail to: astrogram@mail.arc.nasa.gov on or before the deadline.

Deadline	Publication
Mon, Sep 10	Mon, Sep 17
Mon, Sep 24	Mon, Oct 1
Mon, Oct 8	Mon, Oct 15

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 N-235 (8 a.m. to 2 p.m.) ext. 4-6873

Ask about NASA customized gifts for special occasions. Check centerwide emails for special sales and events. Maker your reservations for Chase Park here.

Mega Bites (Ames Café) N-235 (6 a.m. to 2 p.m.) ext. 4-5969

Catering is available for your office B.B.Q. or luncheon. Come by for details. See daily menu at: <http://exchange.arc.nasa.gov>

Visitor Center Gift Shop N-223 (10 a.m. to 4:30 p.m.) ext. 4-5412

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

Tickets, etc... (N-235, 8 a.m. to 2 p.m.) ext. 4-6873

Check our web site for all discounts to local attractions, <http://exchange.arc.nasa.gov> and click on tickets.

NASA Lodge (N-19) 603-7100

Open 7 days a week, 7:00 a.m. to 10 p.m. Rates from \$40 - \$50.

NASA Swim Center (N108) 603-8025

The pool is open for the summer. Book your office birthday party. A fun way to spend the day.

Vacation Opportunities

Lake Tahoe Squaw Valley twnhse, 3bd/2ba, balcony view, horseback riding, hiking, biking, golf, river rafting, tennis, ice skating and more. Summer rates. Call (650) 968-4155, DBMcKellar@aol.com

South Lake Tahoe cottage with wood fireplace and hot tub. Rates from \$50 to \$130 per night. Call (650) 967-7659 or (650) 704-7732.

Vacation rental, Bass Lake CA 14 mls south of Yosemite. 3 bd/1.5 ba, TV, VCR, MW, fireplace, charcoal BBQ, priv. boat dock, great lake view. Sleeps 8. \$1,050/wk. Call (559) 642-3600 or (650) 390-9668.

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

Meteorite yields clues to carbon's evolution

continued from page 10

a research scientist at Arizona State University. Cooper's contribution to the research was to analyze the meteorite for water soluble organics, such as sulfonic acid and carboxylic acids.

The team notes that the chemistry of the Tagish Lake meteorite appears to preserve organics that accumulated or developed in the early history of the solar system, including molecular bubbles of carbon (fullerenes or "buckyballs") containing the noble gases helium and argon in a ratio similar to the gas and dust cloud that formed the planets. This may reflect an early stage in a process of evolution of complex carbon compounds in space.

Other members of the research team included Yongsong Huang from the Department of Geological Sciences at Brown University; Luann Becker from the Institute for Crustal Studies at the University of California, Santa Barbara; Robert J. Poreda from the Department of Earth and Environmental Sciences, University of Rochester; and Ronald A. Nieman and Michael Williams, both also from ASU.

More meteorite samples from space must be analyzed to get the big picture, Cooper said. "It's good that this meteorite is different. We want to look at a broad sample of what's out there."

BY KATHLEEN BURTON



Featured library user

Want to know more about the projects of the chief scientist of Neuro Engineering and Smart Systems, Chuck Jorgensen? Stop by the Technical Library, building N-202, bulletin board. Read all about his accomplishments and current projects. Get copies of his papers on:

Bioelectric Control of a 757 Class High Fidelity Aircraft Simulation. Feedback Linearized Aircraft Control Using Dynamic Cell Structures.

Exchange offers discounted movie tickets

The Ames Exchange offers discounted tickets to all AMC movie theaters. Tickets Etc., located in Beyond Galileo, in Bldg. N-235, has three types of movie passes available.

The AMC gold pass sells for \$7.50. The gold pass allows you to see any movie of your choice, including new releases. The AMC silver pass is good for movies only after the first two weeks of its release and sells for \$6.00. The AMC all-in-one, priced at \$22,

includes two movie passes good for any movie including new releases, two small drinks and one medium popcorn.

Stop by Tickets Etc., Monday through Friday 8 a.m. to 2 p.m. to pick up your discounted movie tickets. While there, check out the deals on other local attractions.

For further information, contact Jodi Bulaich at ext. 4-0818 or email her at: jbulaich@mail.arc.nasa.gov

Pollution Prevention Week

Pollution Prevention Week will be celebrated at Ames from Sept. 17 -- 21. Displays of pollution prevention, recycling and affirmative procurement will be at Mega Bites, the Ames cafeteria. For other planned activities, you can contact the pollution prevention coordinator Gigi Phung at: gphung@mail.arc.nasa.gov



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