

# Astrogram

Communication for the Information Technology Age

## NASA strives to improve computers with nanotubes

The life of the silicon-chip industry may last 10 or more years longer, thanks

developed the new process. "Also, there is no need to create deep, narrow trenches on silicon wafers in which to bury copper conductors, a step that also is becoming a problem as components are made smaller and smaller," Li added.

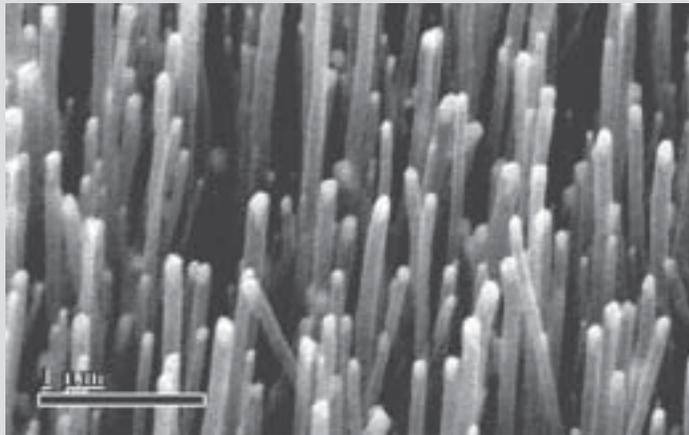
"Our process allows us to use the tiny carbon nanotubes to replace copper to interconnect network layers on silicon chips," Meyyappan said. "We think

servation made by computer chip pioneer Gordon Moore in 1964 that the number of transistors in a given area of an IC had doubled each year since its invention. Moore predicted the trend would continue at a rate of about 18 months between doublings. Continuing down this 'doubling' path is becoming increasingly difficult, according to Meyyappan.

"Roadblocks exist in several common technologies such as interconnects, lithography and others currently used to make the chips," he said. "However, I think our new process could be in use by industry for the next generation of ICs, removing some of these roadblocks," Meyyappan added.

"Using the new process, manufacturers will be able to add more cake-like layers of components to silicon chips to increase computer capability," Li said. Because copper's resistance to electricity flow increases greatly as the metal's dimensions decrease, there is a limit to how small copper conductors can be. In

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NASA photo

Vertically-aligned carbon nanotubes about 100 nanometers in diameter.

to a new manufacturing process developed by NASA scientists.

The novel method, announced in the April 14 issue of the journal Applied Physics Letters, includes use of extremely tiny carbon 'nanotubes' instead of copper conductors to interconnect parts within integrated circuits (ICs). Carbon nanotubes are measured in nanometers, much smaller than today's components. A nanometer is roughly 10,000 times smaller than the width of an average human hair. ICs are very small groups of electronic components made on silicon wafers.

"NASA needs high-performance computing in small packages for future autonomous spacecraft," said Meyya Meyyappan, director of the Center for Nanotechnology at Ames and co-author of the article. "The bottom line is that computer chips with more layers and smaller components can do more for us. While we are working on carbon nanotube-based chips for long-term needs, we also are indirectly helping industry to keep silicon-based computer chips in use as long as possible."

"One advantage of using carbon nanotube interconnects within integrated circuits is that these interconnects have the ability to conduct very high currents, more than a million amperes of current in a one-square-centimeter area without any deterioration, which seems to be a problem with today's copper interconnects," said Jun Li, lead scientist of the team at Ames that

this new process may well help to sustain the Moore's Law growth curve."

Moore's Law stemmed from an ob-

### AF2M preview

See the June 2003 Astrogram for an Ames Freedom to Manage success story regarding streamlining Ames' procurement processes. In the meantime, keep your suggestions coming. To make a suggestion or to find out

# af2m

more, visit the AF2M Web site at: <http://af2m.arc.nasa.gov>

## NASA partners with teacher institute

The House Family Foundation has awarded a \$402,000 grant to the Collaborative for Higher Education's Teacher Institute in Santa Clara County.

Under the terms of the grant, the Collaborative Teacher Institute will partner with NASA Ames to provide professional development for elementary school teachers in science, technology, engineering and mathematics (STEM).

"A key NASA objective is to enhance science and mathematics instruction with unique teaching tools and experiences that only NASA can provide," said Donald James, the education director at Ames. "The teacher institute, supported by this grant, is an important component in support of NASA's objective."

The primary intent of the project is to boost the math and science content knowledge of teachers in grades 3 through 5, many of whom have had limited exposure to these subjects. "If we want children to be excited about learning and pursuing careers in STEM, then it is imperative for teachers to understand and be enthusiastic about the science and math they are teaching," said Miriam Landesman, the teacher institute's education director.

The science content will be based upon the four key content areas of the California grades 3 through 5 science standards and some applications will be drawn from NASA science curriculum already available. The teacher institute

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## Students honored at science and technology championship

A team of Ames employees surveyed nearly a thousand student science-fair projects at this year's Synopsys Silicon Valley Science and Technology Championship held in March at the San José Convention Center.

Led by NASA chief judge Paul Callahan, of Code SLO, the NASA judging team selected 15 projects to receive top NASA honors.

In addition to receiving a NASA certificate of outstanding achievement, winning students will visit Ames on Space Day, May 1, to visit research facilities and be further recognized for their work.



NASA photos by Tom Trower



Ames researchers and students at the recent Synopsys Silicon Valley Science and Technology Championship held in San José.

## R&D Services Directorate completes SOFIA lower flexible door

The R&D Services Directorate met a significant milestone for the Stratospheric Observatory for Infrared Astronomy (SOFIA) program when it completed the lower flexible door assembly. A major Ames program, the 2.5 meter SOFIA infrared telescope will be mounted in a Boeing 747 aircraft that will be home-based at Ames. It will be deployed around the globe to observe far-infrared wavelengths of supernovae and the composition and structure of comets and planetary atmospheres. As described in the June issue of *Aerospace America*: "On a starry night in October 2004, two aerodynamically designed doors will blink open on the fuselage of a refurbished 747 airliner cruising at 41,000 feet."

Designed and fabricated entirely at Ames for the Universities Space Research Association (USRA), the lower flexible door successfully completed its final load testing at Ames and received approval for conformity to FAA requirements prior to shipment to Waco, Texas, for installation in the SOFIA 747 aircraft. Facing significant challenges in creating a one-of-a-kind door for the SOFIA tele-

scope cavity that can repeatedly be opened and closed during flight, the Ames team from the Systems Engineering Division, of Code FE and the Hardware Development Division, of Code FM, worked as a co-located, cross-functional team led by Dave Ackard of Code FM and Bill Caldwell of Code FE.

The team of engineers and fabrication craftsmen from the two divisions worked in a major collaborative effort to create the door design and develop the fabrication techniques necessary to meet the unique configuration of the door's requirement to flexibly adjust to the unique shape of the 747's lower fuselage, which isn't a circle but an ellipse.

Developed as a multiple-panel flexible design, the 8-foot-long and 14-foot-wide door must not only move smoothly during its open-close travel cycle, but also has to do it under the maximum operating-load conditions that will be experienced during flight. This is not unlike opening and closing your garage door in a 250-mile-per-hour wind at minus 70 degrees Fahrenheit.

Modifications to the Ames' fabrication equipment developed by Ackard,

and the development of precision assembly fixtures to both hold the door during assembly, ensured that the high tolerances necessary for repeatability of each door panel were met. To ensure meeting these exacting requirements, and to test the strength of the door, a prototype-door design was developed to FAA standards. Upon completion of prototype testing and FAA approval of the door design and fabrication processes, the R&D services team received the FAA go-ahead to fabricate the flight-hardware door for the aircraft and successfully tested it with 21,000 pounds loaded across its length (twice the expected flight load).

"Successful completion of the lower flexible door exemplifies the reasons why the SOFIA program is resorting to NASA internal resources for the development of such critical systems," stated Caldwell. This same team is continuing to support the SOFIA program in developing other major elements of the cavity-door system, as well as telescope and science instrument equipment.

BY GERALD MULENBURG 

## Continuous improvement goals developed for 2003

As participants in the OSHA Voluntary Protection Program (VPP), we are striving to continually improve our health and safety program. As part of this effort, the center's eight directorates teamed together to create six goals for continuous improvement for 2003. A complete copy of the 2003 goals can be found below or on the VPP Web site at: <http://vpp.arc.nasa.gov>. Information on the status of achieving the centerwide goals can be found at: <http://q/gh/asap/>. Here is a list of the six goals:

1. Recognize employees and improve participation:
  - Encourage employee participation in safety and health;
  - Implement a safety award program to recognize employees whose actions, behavior and/or job performance exemplify improved health and safety conditions;
  - Improve the Safety Suggestion Program; and
  - Maintain effective safety committees and task forces.
2. Ergonomics awareness:
  - Improve employee awareness of methods that can be used to recognize ergonomic hazards and prevent ergonomic injuries.
3. Safety for contractors:
  - Develop and implement effective methods to improve contractor safety;
  - Ensure that contractors maintain accurate injury and illness records and OSHA logs;
  - Recognize contractors who demonstrate exemplary safety and health program performance; and
  - Develop corrective action plans for contractors whose injury rates are not as good as the relevant industry average.
4. Health and safety program self-assessment:
  - Develop and implement a center-wide, self-assessment program in calendar year 2003 to measure the effectiveness and determine the status of the center's safety and health programs;
  - Survey each directorate once a year;
  - Inspect directorate facilities;
  - Review directorate implementation of safety programs;
  - Survey a third of directorate employees annually using the PEP survey; and

- Assess effectiveness of the Ames system for management of chemicals.

### 5. X-Files/C of F

- Manage the scheduling and financial plans for high-cost facility safety improvements

under NASA Headquarters direction.

### 6. Training

- Improve safety and health training through increased oversight of the training needs-assessment process.

## High school presents poster of condolences to STS-107 team

In March, science and technology students from Independence High School in San José visited NASA Ames to present the life sciences STS-107 team and the NASA family with a poster of condolence for the Columbia shuttle tragedy. The signed poster contained words of sympathy and handpainted

by the astronauts and the NASA family. Student Janel Marcelino added her inspiring words to the poster: "Space is a vast frontier where only the brave, the courageous and the intelligent venture. The crew of the Columbia is the virtual representation of those characteristics. And you, NASA, are their inspiration."



Independence High School students seen here with the poster, which they recently presented to the Ames Life Science STS-107 team.

pictures of the astronauts, which were designed by artist and student Danilo Paeste.

Victoria Callor, life science outreach coordinator, welcomed the students, teachers and STS-107 team before they were introduced to Marilyn Vasques, NASA project scientist for the STS-107 team. Vasques gave an overview of the shuttle program at NASA, followed by a multimedia presentation of NASA's STS-107 award-winning video 'Science in Space: Fundamental Biology on STS-107.' She discussed the mission of the team and the experiments that the team conducted. She also spoke with the students about the shuttle tragedy.

The students extended their sympathy to the NASA family on the loss of the shuttle Columbia and presented a poster that they had created in order to commemorate the astronauts of Columbia. Through the poster, teachers and students extended their condolences and prayers for the brave astronauts. They offered words of praise for the knowledge gained and advancements made

by the astronauts and the NASA family. Student Janel Marcelino added her inspiring words to the poster: "Space is a vast frontier where only the brave, the courageous and the intelligent venture. The crew of the Columbia is the virtual representation of those characteristics. And you, NASA, are their inspiration." Michael Reynolds, space technology instructor at Independence High School, sent his condolences: "I am very sorry for your loss, your accomplishments are a true inspiration to my students. I am sending a few astronauts your way."

At the conclusion of the presentation, the students and the STS-107 team members engaged in in-depth discussions and a question-and-answer session. Students were able to direct questions to leading field experts and designers of experiments aboard the shuttle to gain insight about the space program and a good understanding of what the astronauts do before, during and after flights. They covered a variety of topics from the experiments on board Columbia, the effects of space travel and microgravity on astronauts, the work and planning of experiments for the shuttle and the tasks of the astronauts onboard.

The students were captivated throughout the program, enthusiastic about the science, but saddened by the tragedy. They appreciated the presentation and felt they were walking away with a better understanding of recent advancements in science, future projects by NASA, the jobs of astronauts and the space program in general.

"Thank you for letting us have the knowledge to learn about space. I'm

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## NASA centers' exchange council members tour Ames



NASA photos by Dominic Hart

Council members and business personnel from exchanges at the various NASA field centers visited Ames in March for their bi-annual meeting. Here they are seen outside the FutureFlight Central, one of three stops on a short tour arranged for them by the Ames Public Affairs Office. The group also visited the Crew-Vehicle Systems Research Facility and the NASA Advanced Supercomputing facility.

## Ames resumes public tour program

NASA Ames has resumed its popular tour program that allows the general public to visit one of NASA's most historic and cutting-edge research centers.

Two-hour tours are offered five times per week, Monday through Friday, from 9:30 a.m. to 11:30 a.m. Pacific Time.

Tours begin with an overview of the center's key technologies and research and will depart from the visitor center.

"We are pleased to open our doors to area visitors and members of neighboring communities," said NASA Ames Acting Deputy Director Dr. Steven Zornetzer. "We are especially delighted that our guests will have the opportunity to learn about the amazing research going on both at Ames and throughout NASA."

The new tour will take visitors on a walking visit to several of NASA Ames' unique facilities. Possible tour stops include the NASA Advanced Supercomputing facility, featuring some of the world's fastest supercomputers, and the Crew Vehicle Systems Research Facility, which contains two full-size cockpit flight simulators. Other possible sites to be visited

include the Vertical Motion Simulator, used by NASA astronauts and pilots to practice simulated take-offs and landings; a mock-up of the International Space Station; the National Full-Scale Aerodynamics Complex, which contains the world's largest wind tunnel; and the 20-G centrifuge.

"I am truly gratified that we are able to offer public tours again," said Sheila Johnson, NASA Ames' community relations coordinator. "Previously, we averaged 10,000 visitors a year. Clearly, the public wants to visit NASA Ames and is interested in learning about the technologies that we develop for the future," she added.

"Seeing people's interest in space flight and NASA, inspiring the younger generations and seeing the enthusiasm that they display is one of the most gratifying things for me," said new tour program coordinator Michael Reeves, who has worked in the center's wind tunnels for the last 18 years.

To book a tour, call (650) 604-6274. A maximum of 20 people is permitted on each tour.

BY VICTORIA STEINER ▲

## Asian Pacific American luncheon set

May is Asian Pacific American Heritage Month. In homage to the space shuttle Columbia crew, which included our former Ames colleague Dr. Kalpana Chawla, the theme of this year's Ames observance is 'Being Brave and Courageous.'

On May 22, the annual Asian Pacific American heritage luncheon will be held from 11:00 a.m. to 1:00 p.m. Polynesian and Vietnamese dancers will welcome guests.

Noted Apple Macintosh 'evangelist' Guy Kawasaki will be the guest speaker. Kawasaki is presently the CEO of Garage Technology Ventures, a boutique investment bank for high-technology companies. He also is the author of several books, including 'Rules for Revolutionaries,' 'How to Drive Your Competition Crazy' and 'The Macintosh Way.'

Ticket sales will begin in late April at various locations around the center. Look for the Asian Pacific American Heritage Month posters for details. You will also be able to purchase tickets at the Mega Bites cafeteria at lunchtime. Ticket sales end on May 19.

BY KRISTINE NAVARRO ▲  
AND TERRY PAGADUAN

## Equivalence principle discussed at seminar

The American Institute of Aeronautics and Astronautics (AIAA) San Francisco Section hosted a seminar at Ames



Paul Worden speaks at the recent seminar on testing the equivalence principle in a satellite.

in March entitled 'STEP -- Testing the Equivalence Principle in a Satellite,' presented by Dr. Paul Worden of Stanford University.

Galileo's apocryphal experiment from the leaning tower is arguably the most famous physics experiment. It tests

## Scientist speaks on 'new cosmology'

A large and enthusiastic crowd turned out in March to hear renowned astronomer and astrophysicist Dr. Michael Turner of the University of Chicago deliver a talk on 'Making Sense of the New Cosmology.' Turner used colorful hand-drawn slides to drive home several points:

- the age of the universe is now thought to be 13.7 billion years old;
- we are homing in on the size of the Hubble constant, (the rate the universe is expanding); and
- cosmologists are being helped by the oldest, most distant light seen in the universe -- from the cosmic microwave background, when the universe was a mere 380,000 years old. This light helps physicists map the distance and density of matter.

Turner said new information from COBE satellites and WMAP, a NASA Explorer mission that measures the remnant heat from the 'Big Bang,' are now allowing 'precision cosmology' and helping humans answer fundamental questions about the origin and fate of our universe.

The talk was sponsored by the Space Science Division colloquium series.

a fundamental postulate of Einstein's general relativity, the uniqueness of free fall, which implies the equivalence of inertial and gravitational mass and allows the geometrization of space-time.

Tests of the Equivalence Principle on the ground are limited to measuring differences in the solar acceleration of about one part in 1,013 by disturbances and the small size of the acceleration, or by the short drop time. Equivalence Principle tests in orbit can do better by using almost the full acceleration of Earth's gravity and a quieter environment. The

technologies needed for the Satellite Test of the Equivalence Principle (STEP) to reach one part in 1,018 were described.

Worden did his undergraduate work at Rice University and completed his graduate work at Stanford University in 1976. The concept for an orbital Equivalence Principle experiment developed in his thesis ultimately led to the STEP program.

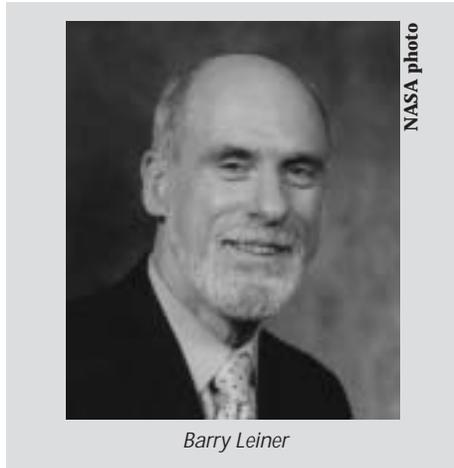
Worden is presently the co-principal investigator on STEP at the Hansen Experimental Physics Laboratory at Stanford University.

## Former RIACs director, Leiner passes on

Dr. Barry M. Leiner, former director of the Research Institute for Advanced Computer Science (RIACS), passed away at his home on April 2. Leiner had a long tenure with RIACS at NASA Ames, serving as assistant director from 1985

to 1999. Leiner was a graduate of Rensselaer Polytechnic Institute (B.E.E.E. 1967) and Stanford University (M.S.E.E. 1969, Ph.D. 1973). He was a member of Eta Kappa Nu, Tau Beta Pi, ACM and the Internet Society and a senior member of the IEEE.

A memorial service for Dr. Leiner will be held on May 7 in the Building N201 auditorium beginning at 9:00 a.m. The memorial service will be followed by the inaugural lecture of the Leiner Lecture Series starting at 10:00 a.m. The lecture will be presented by Dr. Vinton G. Cerf, one of the 'fathers of the Internet' and a long-time friend and colleague of Dr. Leiner.



Barry Leiner

to 1990; as director from 1999 until 2003 and as chief scientist since January 2003.

Leiner devoted his career to the advancement of packet-switched networking technologies and he is renowned for his contributions to the emerging Internet community while at ARPA in the early 1980s.

He started his distinguished career as senior research engineer with GTE Sylvania from 1967 to 1973; assistant professor at Georgia Institute of Technology from 1973 to 1976; senior engineering specialist at Probe Systems from 1976 to 1980; assistant director of the ARPA Information Processing Techniques Office from 1980 to 1985; director of research with Advanced Decision Systems from 1990 to 1992; senior scientist with USRA from 1992 to 1994; assistant director of the Information Technology Office at DARPA from 1994 to 1996; vice president of Microelectronics and Com-

puter Technology Corporation (MCC) from 1996 to 1997; and special assistant to the president at the Corporation for National Research Initiatives from 1998 to 1999.

BY SERDAR UCKUN ▲

## Leiner lecture set

The Research Institute for Advanced Computer Science (RIACS) and NASA Ames present a new lecture series in applied information technology, the Leiner Lecture Series.

The focus of the Leiner Lecture Series is the impact of information technology on science and society, including its contributions to NASA science goals. The lecture series is dedicated to the memory of Dr. Barry M. Leiner, former director of RIACS and one of the pioneers of the Internet revolution.

The inaugural lecture, entitled 'Networking the Science Community: Past and Future,' will be presented by Dr. Vinton G. Cerf on May 7, at 10:00 a.m. in the N-201 auditorium. Cerf is senior vice president of architecture and technology at MCI and is commonly known as one of the fathers of the Internet.

## Bradford Wick, researcher and manager, passes away

On Feb. 3, Bradford H. Wick, who made numerous research and management contributions to Ames and to flight,



NASA photo

Bradford Wick

lost his long battle with Parkinson's disease. At the end, Ruth, his wife, said he was still worrying about an unsolved problem in aerodynamics -- very typical of Wick's career.

Wick came to Ames from U.C. Berkeley in May 1942, when the first staff was being formed. He was assigned to the first operating wind tunnel branch at Ames, the 7-foot-by-10-foot wind tunnels under the direction of Harry Goett. It was soon evident that Wick was not satisfied with only obtaining aerodynamic data from the wind tunnel. He

was driven to understand why any deviation from expectations occurred, a characteristic of true research.

For this reason, he was assigned to the 40-foot x 80-foot wind tunnel when it first opened and presented many new problems as the largest and fastest full-scale test facility in the world, enabling detailed studies of aerodynamic flows. Here, he encouraged Dean Chapman and Harvard Lomax in their pioneering efforts to refine gas-flow theories, thus laying the groundwork for computational fluid dynamics.

When it became evident that human space flight would develop, Ames undertook the exploration of methods enabling survival of atmospheric-reentry heating. Wick was assigned to develop facilities to duplicate the phenomena and directing research to find how to protect humans through the reentry phase of flight. When the fundamental aspects of the problem were understood

and ways to resolve it were identified, the problem was passed on to NASA's space flight programs for application.

With the reentry problem in other hands, Wick was named chief of the Flight Systems Research Division with the specific objective of achieving successful vertical or slow landing of aircraft having cruise capabilities of conventional aircraft. He recognized the need for electronic flight-control systems to make such vehicles possible and the need for special flight simulators to accelerate research while maintaining safety. Evidence of his success in this effort is seen in the Ames research that led to the most advanced and possibly the last, piloted fighter aircraft, the Joint Strike Fighter.

Wick's successful career certainly emphasized the importance of not only defining what happens but why it happens.

## NASA project inducted into Space Technology Hall of Fame

A new technology developed for NASA called the Virtual Window that provides real-time 3-D images without the use of glasses or special helmets was inducted recently into the Space Foundation's 2003 Space Technology Hall of Fame.

Developed by Dimension Technologies Inc., of Rochester, N.Y., for NASA Ames, Virtual Window was created to interpret large masses of data, such as those associated with the fluid flow around space shuttle launches. NASA engineers believed that a 3-D presentation of this information would help interpret the information. Funding was provided through NASA's Small Business Innovation Research (SBIR) program.

"We are delighted that the Space Foundation has selected Virtual Window for induction into the 2003 Space Technology Hall of Fame," said Carolina Blake, chief of the Commercial Technology Office at Ames. Dr. Steven Zornetzer, acting deputy director of NASA Ames, along with representatives of Dimension Technologies, accepted the award.

Former NASA Administrator Richard Truly presented the awards on April 10 during the fifteenth anniversary Space Technology Hall of Fame dinner in Colorado Springs, Colo.

To achieve the 3-D images, Dimension Technologies Inc. developed a series of flat-panel, liquid-crystal display (LCD) screens that can switch instantly from 2-D to 3-D. The display has nu-

merous other commercial applications, such as computer games, protein analysis and surgical imaging.

Two other NASA field centers, NASA Kennedy Space Center (KSC) in Florida and NASA Marshall Space Flight Center in Alabama, were inducted into the 2003 Space Technology Hall of Fame. Adam Kissiah Jr., a retired KSC engineer, was honored for his development of the digital hearing aid technology that led to the cochlear implant. Former Marshall Space Flight Center engineers John Richardson and Joseph Howard Kerr helped develop the technology for the VisiScreen Ocular Screening System used to detect abnormalities in the human eye.

In cooperation with NASA, the Space Foundation established the Space Technology Hall of Fame in 1988 to honor the innovators who have transformed space technology into commercial products, to increase public awareness of the benefits of space spin-off technology and to encourage further innovation.

Headquartered in Colorado Springs, the Space Foundation is a national, non-profit organization whose mission is to vigorously advance and support civil, commercial and national security space endeavors and educational excellence.

For more information about the Space Foundation or for information about the Space Technology Hall of Fame on the Internet, visit the Web at: <http://www.spacefoundation.org/>

BY MICHAEL MEWHINNEY

## Bike to Work Day

The Moffett Park Transportation Management Association and the Ames Environmental Services Office will be hosting a Bike-To-Work Day Energizer Station at the NASA light rail stop outside the Ellis Street gate on May 15 from 6:00 a.m. to 9:00 a.m. Why is it called an Energizer Station? Because we provide free, premium-grade bike fuel (refreshments, energy bars, etc.) as well as lots of other goodies in order to encourage people to try a healthful and environmentally friendly commute option.

Do you live too far away to contemplate riding all the way to Ames? No problem, just pedal to the nearest transit stop and take your bike on board the bus, light rail or Caltrain. So take that old bike out of the garage, pump up the tires, and plan to visit on Bike-To-Work Day! For more information, visit: <http://www.511.org/> or call Julie Morsellino at ext. 4-6810.

## Ames to partner with Moffett Field Historical Society

NASA and the Moffett Field Historical Society signed an agreement recently that will give the public greater



photo by Moffett Field Historical Society

Front entrance to the Moffett Field Historical Society Museum.

access to information about Moffett Field's colorful past and allow the par-

ties to collaborate on a variety of educational activities.

Established in 1993, the historical society has operated the Moffett Field Historical Museum in Hangar One for many years. Under terms of the new four-year agreement, the non-profit society will work with NASA to showcase Moffett's impressive military history while supporting joint educational objectives. The society also agrees to complete several construction projects in the museum and Hangar One, including installation of a sprinkler system and a fire alarm system, to comply with federal safety regulations.

"We are delighted to sign this agreement and look forward to working with the Moffett Field Historical Society for many years to come," said Ames Center Director G. Scott Hubbard. "Hangar One is a national landmark, widely recognized as an historic facility. Having the society exhibit unique artifacts and memorabilia and explain the military history of the site will be terrific for both students and adults alike," he added.

"The Moffett Field Historical Society attracts students and visitors from

all around the world and we are excited to be joining with NASA to educate the public about the history of Moffett Field and Ames, as well as to share the center's vision for NASA Research Park," said Moffett Field Historical Society President Bernard McDonough.

Under the terms of the agreement, the historical society will be allowed to use approximately 5,000 square feet in Hangar One and an additional small building of approximately 500 square feet to store its exhibits. The historical society also will support the NASA Ames educational programs, such as providing speakers to educate students about the history of Moffett Field or Hangar One.

For more information about NASA Research Park on the Internet, visit: <http://researchpark.arc.nasa.gov>

For more information about the Moffett Field Historical Society on the Internet, visit: <http://www.moffettfieldmuseum.org>

BY MICHAEL MEWHINNEY ▲

## Ames' ergonomics demonstration room is popular

Many employees have used the ergonomics demonstration room in Building 218, Room 210A over the past few



photo by Miriam Glazer

Ames' ergonomic demonstration room located in Building 218, Room 210A.

filled to the brim with ergonomic chairs, tables and accessories. Miriam Glazer, the ergonomics program manager, says

"The ergonomics room has been getting much more usage lately as good ergonomics is becoming part of the Ames culture." One of the goals of the Voluntary Protection Program for FY '03 is to ergonomically assess all civil servants on site. As evaluations increase, so will the ergonomic-room traffic.

Glazer has added many ergonomic accessories to Stores

of chairs, keyboard trays, input devices and computer tables to bring a wide variety of low-cost items to the demo room. The ergonomics demonstration room is always open, so drop by anytime. However, if you want to try the chairs, or have specific needs, make an appointment with Glazer by calling ext. 4-5172. She can help you choose the right chair for your body type and consult on any special needs to help you make the best decisions.

According to Glazer, "We are all industrial athletes and if we're not using the proper equipment, or working correctly, we can become injured."

Glazer teaches a monthly office ergonomics class that is recommended for those who work four hours or more a day on the computer. You can sign up on the Code QH Web site at: <http://q.arc.nasa.gov/> or under Code QH training/registration. You may also want to check out the ErgoSmart training tool at the Web site under health/ergonomics.

years. To others, it may be a well-kept secret. This room, although small, is

Stock to make the ordering process easier. She has done an extensive search

## NASA scientists measure ozone loss above Arctic Circle

In a major science mission to measure northern ozone loss and other stratospheric conditions, more than a dozen Ames employees, along with some 350 scientists from around the

world, including about 100 U.S. researchers, spent five weeks beginning in January based in the Swedish Arctic. In addition to the United States, the European Union, Canada, Iceland, Japan, Norway, Poland, Russia and Switzerland participated in the NASA-led, joint effort. Scientists expect to release results of the campaign in six to nine months.



photo by Kathy Thompson, CSC

Members of Ames' Earth science project office team pose in front of NASA's DC-8 aircraft. Pictured from left to right are: Quincy Allison, Kent Shiffer, Sue Tolley, Mike Craig and Mike Gaunce.

A great deal of the mission focus was related to the ozone layer that protects life on Earth from the sun's harmful ultraviolet radiation that could cause skin cancer in human beings and biological damage to living things.

"There were several mission goals, but the primary goals were to quantify the accuracy and sensitivity of the NASA Stratospheric Aerosol and Gas Experiment (SAGE) III satellite instrument, and also to better understand the conditions leading to the birth of polar stratospheric clouds," said James Podolske, a scientist in Code SGG and part of the center's contingent.

Polar stratospheric clouds are involved in the process that destroys ozone in the stratosphere. The stratosphere comprises Earth's atmosphere from about nine to 25 miles (about 15 to 40 kilometers) altitude and includes the ozone layer. Carried aboard the Russian Meteor-3M satellite that was launched in December 2001, NASA's SAGE III instrument measures ultraviolet and vis-

ible light and gathers data regarding vertical structure of aerosols, ozone, water vapor and other trace gases in the upper troposphere and stratosphere. The troposphere extends from the planet's surface up to the stratosphere.

Ames scientists recorded ozone, water vapor and other data observations from the NASA DC-8 aircraft, worked on computer models of polar stratospheric clouds and served as meteorologists. Michael Craig, of Code SGG, the Earth science project office, was the NASA project manager for the mission, the seventh arctic mission managed by that office.

"The experiment went very well," Craig said. "We had few instrument failures, and this enabled us to have successful science flights nearly every other day." Craig is responsible for the planning, site selection, site surveys, contracts, agreements and field management -- basically all the operational aspects of the mission.

The campaign goal to measure the amount of ozone loss involved a complicated set of conditions and processes. "The mission provided numerous opportunities to investigate the formation of polar stratospheric clouds and their role in the chemical processing of the polar vortex, as well as to quantify the degree of early winter ozone loss," said Michael Kurylo, manager of NASA's Upper Atmosphere Research Program in the Office of Earth Science at NASA Headquarters.

The polar vortex is a whirling, northern atmospheric circulation zone with strong low pressure. This fluid vortex usually moves very slowly or is stationary, and often it changes location and shape over weeks and may even split into parts. The vortex may disappear in summer and is strong in winter.

The mission, the second SAGE III Ozone Loss and Validation Experiment (SOLVE-II), took place from January until April. To validate measurements from the Meteor-3M SAGE III satellite mission, SOLVE-II scientists measured

ozone, aerosols and trace gases using NASA's DC-8 aircraft along with balloons, rockets and sondes. A sonde is an instrument that scientists use to test conditions, in this case, at high altitudes. The field campaign also acquired correlative measurements with atmospheric chemistry instruments on board NASA's Polar Ozone Aerosol Measurement satellite (POAM) and the European Space Agency's Environment Satellite (ENVISAT), an advanced polar-orbiting Earth-observation spacecraft.

The DC-8 contained 14 primary in situ (in position) and remote-sensing instruments. One of these, a sun photometer, was developed at Ames. "We built the instrument at Ames roughly between 1995 and 2000," said Philip Russell of Ames' Atmospheric Chemistry and Dynamics Branch. "It and its predecessor, also built at Ames, are the only two instruments of their kind."

"It looks like a miniature telescope dome, and it has a little telescope inside it that holds our detectors -- photodiodes," Russell said.

"The Ames Airborne Tracking Sunphotometer (AATS) measures aerosols, ozone and water vapor by observing how they affect sunlight transmission," Russell explained. "This is the same measurement principle used by the SAGE III satellite sensor. AATS measurements can be used to check SAGE III results and to see how aerosols, ozone and water vapor vary between SAGE III measurement points." The AATS SOLVE-II team included Jim Eilers, Ric Kolyer, John Livingston, Jens Redemann and Beat Schmid, all from Ames.

One of the scientists from Ames who took part in the SOLVE-II project was Katja Drdla, a principal investigator working on polar stratospheric cloud computer models and forecasts. Also, there was Ames' Podolske, with colleagues from Langley, who used instruments on the DC-8 aircraft to make in-situ water vapor measurements to better understand conditions leading to polar stratospheric cloud formation.

Leonhard Pfister and Henry Selkirk, both of Ames, were the lead meteorologists for the mission. Their primary scientific interest was to understand water vapor and cloud formation near the tropopause. The tropopause is the region of transition between the troposphere and the stratosphere. The troposphere extends five to eight miles up from the planet's surface, is below the stratosphere and contains Earth's weather and almost all atmospheric water vapor.

"Water vapor and clouds are important in regulating the temperature at

*continued on next page*

# NASA scientists measure ozone loss above Arctic Circle

*continued from previous page*

the Earth's surface, and changes in water vapor in the tropopause region are particularly effective in changing the heat balance at the surface," Pfister said. "What I want to understand is how effective 'cold spots' in the tropopause region are in producing clouds, precipitation and subsequent removal of water vapor," Pfister explained.

NASA's DC-8 airborne science laboratory, based at the Dryden Flight Research Center, flew 11 science flights in and around the polar vortex to collect data along a variety of flight paths. The flights were typically eight to 10 hours, ranged between 25,000 and 40,000 feet in altitude and flew as far north as the Pole.

Although scientists have just begun to analyze the data obtained on these flights, initial results indicate that the comparisons with SAGE III were extremely successful. The mission also demonstrated computer modeling and forecasting of polar stratospheric cloud formations. Based on polar-stratospheric cloud forecasts, mission scientists determined the optimal flight paths to maximize science return. The polar-stratospheric cloud observations made will help establish the causes of early ozone loss.

Scientists carried out the mission from the Arena Arctica, a research facility located in Kiruna, Sweden, with a population of 25,000. The local government in Kiruna developed this unique center that has hangar and laboratory facilities for conducting high-latitude, low-temperature science investigations. Kiruna is in Lapland, in northern Sweden, about 100 miles north of the Arctic Circle. Temperatures in January ranged from minus 5 Celsius (23 degrees Fahrenheit) to nearly minus 40 Celsius (minus 40 degrees Fahrenheit).

Although SOLVE-II researchers worked seven days a week and as many as 16 hours a day, some NASA team members had spare time to visit the world-famous Ice Hotel, see the Aurora Borealis, go snowmobiling or cross-country skiing or simply enjoy the beauty of the snow-covered town. Craig even participated in the annual reindeer races, held during Kiruna's Winter Festival.

"The northern lights were beautiful," said Russell. "They looked like streamers across the sky, like, maybe a curtain across the sky -- mostly greenish-bluish."

"The days were getting longer when I was there in late January," Russell continued. "The day length changes quickly from day to day. It was dark more than 12 hours a day. There was a long twilight because the sun was just

below the horizon for a long time," Russell said.

Participants included researchers and support personnel from various NASA facilities including Ames, Dryden, Goddard, Headquarters, Langley, the Jet Propulsion Laboratory and Wallops. Participating government organizations included the Department of Defense Office of Naval Research, the National Oceanic and Atmospheric Administration and the National Center for Atmospheric Research.

"The SOLVE-II campaign was successful in achieving every aspect of its ozone science and satellite validation objectives," concluded Kurylo. "Coincidental measurements made during satellite overpasses provided an unprecedented wealth of complementary remote sensing and in situ data for use in validating not only the solar occultation measurements of the SAGE III and POAM III satellite instruments, but also the exploratory limb-scattering measurements that were acquired by SAGE III in support of the STS-107 Shuttle Ozone

Limb Sounding Experiment (SOLSE)/Limb Ozone Retrieval Experiment (LORE). SOLVE-II was an excellent example of the successful implementation of complementary science and satellite validation."

The SOLVE-II campaign was part of NASA's Earth Science Enterprise, a long-term effort that utilizes the unique vantage point of space to view our home planet to better understand and protect life here. More information about SOLVE II is on the project Web site located at: <http://cloud1.arc.nasa.gov/solveII>.

SOLVE-II was co-sponsored by the Upper Atmosphere Research Program, the Radiation Sciences Program, the Atmospheric Chemistry Modeling and Analysis Program and the Earth Observing System of NASA's Earth Science Enterprise. The SOLVE-II effort also was conducted in close collaboration with the Validation of International Satellites and Study of Ozone Loss (VINTERSOL) campaign sponsored by European Commission.

BY CODE SGG EMPLOYEES ▲

## O'Keefe congratulates Hawkins

Leticia Hawkins, Ames' educator astronaut liaison to NASA Headquarters (center), was recently congratulated on her birthday by NASA Administrator Sean O'Keefe (right).



NASA photo

## Ames Travel Manager goes live May 5



Ames Travel Manager training is being offered through May 30. Visit the Internet Web site at: [www.travelmanager.arc.nasa.gov](http://www.travelmanager.arc.nasa.gov) to view the Travel Manager course offerings and schedule.

## Airports adopt Ames technology for clearer vision

Three Bay Area airports are taking over NASA-built weather observation

software the team built especially for the project to capture and archive images and spot weather trends.



One of two remote-controlled camera systems used in RTSS project at San Francisco. Similar systems are also installed at other airports.

systems that give pilots and air traffic controllers a pair of eyes on the runways.

The Remote Tower Sensor System (RTSS) is a Web-based set of high-speed cameras that broadcast real-time reports online to warn of cloud cover and fog, plus a range of other conditions that can cause landing delays.

A technology transfer took place in fall 2002 following the end of the project's funding, said NASA technical lead David Maluf. The airports--Half Moon Bay, San Carlos and San Francisco (SFO)--want to keep the systems.

"In my opinion, for San Francisco it's absolutely critical to us," said Garry Hinds, United Airlines weather center operations manager in Chicago. Since almost half of SFO's landings are United Airlines aircraft, the airline is SFO's most frequent runway user. Hinds uses RTSS to schedule flights to San Francisco. "It's the best way we have to clearly see what's happening at the airport, to make the best plan we can."

With the technology transfer, the entities running the airports own the RTSS systems. San Mateo County runs San Carlos and Half Moon Bay airports. San Francisco, which is still negotiating its transfer, owns SFO.

As part of the plan, NASA is handing over the RTSS hardware and software, including an image-processing

The RTSS cameras are remote-controlled Sony digitals that run 24 hours and provide a 220-degree field of view with rotation, zoom and tilt capabilities. A set of sensors measures wind speed and direction, barometric pressure, air temperature and humidity.

At most of the large airports in the country, controllers make their flight plans based on the weather-sensor information alone.

However, San Francisco

International Airport is unique. Cloud coverage there can change rapidly from clear to heavy to thin, then back to heavy again. Because of frequent, low-lying clouds and fog combined with a close runway setup -- the airport's two strips are parallel and just 750 feet apart -- safety rules require a pilot to have both runways in sight before landing.

During poor weather conditions, SFO shuts down one runway, which instantly cuts the airport's landing capacity in half, from 60 to only 30 planes an hour. A shutdown not only slows landings, it delays takeoffs and causes backups in the air and on the ground that in turn slow flights.

Outside the nation's large airports are hundreds of small airports that don't have control towers. At Half Moon Bay Airport, for example, a remote observation station is the only continual set of eyes there.

"Before flying, pilots can check out landing conditions from personal computers, which is helpful because fog tends to pour in without warning from the mountains between Half Moon Bay and San Carlos Airport," said Walt Strach, meteorologist in charge at the Oakland Air Route Traffic Control Center in Fremont. "We can see that happening with the cameras," Strach said.

NASA robotics engineer Kevin Bass said small planes are vulnerable in heavy

wind.

"A lot of people will fly only in good weather," Bass said, noting that private pilots can park their planes and watch for a clear-weather window. "They can just keep their computers on."

Early prototypes for RTSS, called the Airport Approach Zone Camera System (AAZCS), were installed in 1998 at SFO, San Carlos Airport, Seattle-Tacoma International Airport and Hartsfield Atlanta International Airport. The next generation of RTSS was deployed to those airports in 2000 and to Half Moon Bay in 2001. NASA developed AAZCS and RTSS with the Federal Aviation Administration and the National Oceanic and Atmospheric Administration.

The systems were first steps toward the team's long-term goal of integrating the system with FutureFlight Central (FFC), NASA's virtual air control tower. A next-generation RTSS could provide real-time data for flight simulation at the FFC, which has a model of SFO, NASA computer scientist Peter Tran said. But the team never realized the goal, "because of funding issues that never really took off," he said.

Another idea still being considered is providing real-time remote operations at FFC for airports without control towers, Maluf said. "One tower like FFC can handle hundreds of unmanned airports."

But that plan is uncertain. "We've always struggled to fund this project even though it has such a high success," said Maluf.

BY BETH MINNECI ▲

## NASA hopes to improve computers

*continued from front page*

contrast, extremely tiny carbon nanotubes can substitute for copper conductors in smaller computer-chip electronic configurations because carbon-nanotube electrical resistance is not high.

The new process includes 'growing' microscopic, whisker-like carbon nanotubes on the surface of a silicon wafer by means of a chemical process. Researchers deposit a layer of silica over the nanotubes grown on the chip to fill the spaces between the tubes. Then, the surface is polished flat. Scientists can build more multiple, cake-like layers with vertical carbon nanotube 'wires' that can interconnect layers of electronics that make up the chip.

More information about NASA nanotechnology can be found on the Web at: <http://www.ipt.arc.nasa.gov>

BY JOHN BLUCK ▲

## NASA Ames honored for sound environmental management

NASA Ames has been selected by the Environmental Protection Agency (EPA) to join its National Environmental Performance Track (NEPT) program in recognition of its outstanding environmental management practices.

The EPA's NEPT program is a voluntary partnership comprised of public and private organizations that exceed compliance with environmental regulations. NEPT partners are committed to continuous environmental improvements and demonstrate in daily business operations that economic prosperity and environmental protection can go hand in hand. The program was launched in June 2000 and has 304 members.

"We are delighted to be recognized by the EPA for our environmen-

tal management practices at Ames," said Sandy Olliges, chief of the Environmental Services Division at NASA Ames. "This reflects well on Ames' longstanding efforts to protect our environment here at Moffett Field and bodes well for the center's environmental future."

NASA Ames was one of 37 new members of the program announced by EPA Administrator Christine Whitman and the only NASA field center so honored.

For more information about NASA and agency centers on the Internet, visit: <http://www.nasa.gov>

For more information about the NEPT program, visit the Web at: <http://www.epa.gov/performance-track>

BY MICHAEL MEWHINNEY ▲

## High school presents poster of condolences to STS-107 team

*continued from page 3*

sorry for the loss of the seven astronauts. May they rest in peace," said Anna Nguyen, a student at Independence High School.

The event was organized by Cari Vaeth, principle of Independence High School; Nancy Lorenzen, teacher and coordinator of Space Science and Technology Magnet; and Victoria Callor of Code SL.

Lorenzen added to the colorful poster by sending her blessings to the NASA family: "Throughout history mankind has searched for knowledge of what is unknown. We lost not only seven valuable lives but also the knowledge that these men and women gained. God bless these adventurers! And God bless those scientists whose work was lost."

BY SABAHAT F SHAIKH ▲

## STS-107 memorial on display at visitor center



*This memorial tribute to the seven brave astronauts who perished in the Columbia accident is now on display at the Ames visitor center for public viewing by our employees, visitors and guests.*

## Kao named to IEEE editorial post

NAS Division scientist David Kao has been named an associate editor of Transactions on Visualization and Computer Graphics (TVCG), a quarterly journal of the IEEE. The journal is designed to inform readers of the state of the art of the specialized field of scientific visualization.

During his two-year tenure, which began in February, Kao's duties will include soliciting manuscripts for the journal, distributing them to recognized experts for peer review and evaluating and recommending them for publication. Kao has published extensively in the scientific visualization field and has served as co-chair or member of technical committees at several international conferences. He received his doctorate from Arizona State University in computer science.

David Ebert, newly appointed TVCG editor-in-chief, cited Kao's "reputation in the field" and recommendations from colleagues and current members of the TVCG editorial board as the basis for the appointment.

As a scientist in the NAS Division's research branch, Kao is working with government and university collaborators to develop several new visualization tools and techniques for analyzing Earth and space-science data. Some of the techniques will be applied, for example, to Earth observing system satellite image-derived data representing snapshots in time of the Earth's surface.

Kao has co-developed several visualization software packages, including the award-winning Unsteady Flow Analysis Toolkit (UFAT), a pioneering tool for visualizing very large time-dependent or 'unsteady' flow datasets. UFAT reduces the analysis time of multi-gigabyte datasets from weeks to hours, and has been used to process and analyze simulation results of the space shuttle and artificial heart devices.

TVCG publishes papers that present important research results and state-of-the-art seminal papers related to visualization and computer graphics techniques, systems, software, hardware and user interface issues.

## 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.

## HACE members present scholarships to four students

The NASA Ames Hispanic Advisory Committee for Employees (HACE) recently awarded four \$500 scholarships. HACE linked with existing community college programs to present these scholarships to four students who are transferring from a 2-year community college to a 4-year university. The students were members of an Enlace honors society, which focused on science and math. The Enlace Program is a team of college staff and mentors with the mission of helping Chicano/Latino students succeed. The Enlace Program consists of three components: academic, counseling and mentoring. The academic program emphasizes the areas of English, math and science, which lie at the heart of students' academic achievement and performance throughout the general/transfer course work.

The counseling program provides the counselor to meet with the students on a regular basis both in and out of class, and monitor their academic progress. In addition, the counselor helps the students set career goals, take appropriate courses and prepare to graduate and/or transfer to a bac-

calaureate-granting institution.

The Enlace Program has brought together over 65 Chicano/Latino community professionals to participate as mentors in the program. The mentors share their personal, academic and career experience. The mission of the Enlace Program is to increase the educational success of Chicano/Latino students.

In honor of the Hispanic Heritage Month in September 2002, HACE sponsored the annual luncheon, featuring as luncheon speaker Dr. Miguel Nevarez, president of Pan Am Texas University, and entertainment by local artist Manuel Romero and the Latin Folkloric dancers. It also sponsored the first Hispanic



photo by Bobby Jackson

HACE members and scholarship recipients, from left to right: Monica Mendoza (HACE member), Jorge Urbina (scholar recipient), Bobby Jackson (HACE), Maria Mariscal (recipient), José Juárez (recipient), Erica Villa (recipient), Eric Kristich (HACE) and Vivian Torres (HACE).

heritage golf tournament. HACE is proud to have sponsored these events and HACE is happy to provide these scholarships to these students in an effort to reach out to the Hispanic community.

BY ERIC KRISTICH ▲

## Telly Award presented for STS-107 outreach video

'Science in Space: Fundamental Biology on STS-107,' an outreach video about the experiments on board the space shuttle Columbia during its last flight, earned a prestigious Telly Award in recognition of the distinguished video production effort in the science education category.

Barbara Beck, producer of the show and a former team member of the Documentation Technology Branch, is the proud recipient of the four-and-a-half-pound silver statuette that symbolizes outstanding quality and art work of the non-network and cable-commercial programs.

"It's an honor to be recognized with a Silver Telly Award," said Beck. "This was one of the most challenging and interesting videos I was fortunate enough to produce at NASA Ames for Marilyn Vasques and Kurt Liittschwager. I share this award along with the JIT video group. Without their vision and input, this video wouldn't have been possible. Of course, the award is tinged with sadness due to the tragic outcome of the mission and the loss of Columbia and its crew," she added.



photo by Nathan Robinson

Barbara Beck (center) and Jesse Carpenter (right) interview principal investigator Dr. Fred Sack (left) at Ohio State for the STS-107 payload video.

Founded in 1980, the Telly Award uses a 10-point scale to judge the videos. Entries do not compete against each

other, but rather, they are judged by top production professionals against a high standard of excellence.

BY VICTORIA STEINER ▲

## Galileo remembered with scholarship fund

NASA's first Galileo probe was not the probe sent to Jupiter. The first was a highly successful research aircraft lost 30 years ago this April in a tragic mid-air collision with a Navy P-3 Orion. The accident claimed 16 lives, 11 on the Galileo and five on the Orion. The lone survivor was a Navy observer, Petty Officer Mallibert.

The Galileo was NASA Ames' first flying laboratory. The flying laboratory was a Convair 990 jet aircraft acquired in 1965 and used as a test-bed for the development of airborne astronomy and atmospheric and ground observation technologies. The success of the Galileo helped demonstrate the value of airborne laboratories to accomplish NASA research goals.

The Galileo's first mission was the tracking of a solar eclipse in May 1965. To accomplish this task, 13 12-inch optical-quality glass apertures were installed on the upper left side of the fuselage. In its short eight years of service, the Galileo made observations of solar eclipses, meteor showers, comets and planets. One of Galileo's most notable missions helped determine that the cloud cover on Venus is made of sulfuric acid and not water.

The last flight of the Galileo was a two-hour flight over Monterey Bay to test newly installed equipment to survey migratory sea mammals. The collision with the P-3 Orion occurred on April 12, 1973 at about 3:00 p.m. over the twelfth tee of the Sunnyvale municipal golf course.

In honor of the brave crew members lost on the two aircraft, the Galileo II was commissioned to continue the valuable work of the original aircraft Galileo.

"The best memorial for them is to re-dedicate ourselves to continue the work in which they were engaged when they perished. I pledge to you that we will continue to develop our capabilities in airborne research at Ames so that we will be second to no one in this field. In this way, we can be sure that what they did will continue to live," said Dr. Hans Mark in a memorial address to Ames and Navy personnel on April 19, 1973.

To continue the legacy of the Galileo, Ames and the San Francisco chapter section of the American Institute of Aeronautics and Astronautics (AIAA) established the Galileo memorial scholarship open to public high school seniors in the eight San Francisco Bay area counties intending to pursue careers in engineering, mathematics or physical or natural science. The highly competitive scholar-

ship awards several \$1,000 to \$2,000 scholarships annually.

The scholarships have been awarded to outstanding students for well over a quarter of a century. To continue the legacy of the Galileo, donations will be accepted by the non-profit AIAA organization to help support the important endeavor of promoting and continuing

higher education among the nation's youth. One hundred percent of the donations goes toward the scholarships.

For more information about the Galileo memorial scholarship, contact Juanita Ryan, AIAA pre-college outreach director at e-mail: mpryan1@earthlink or by calling (408) 251-5365.

BY JONAS DIÑO ▲

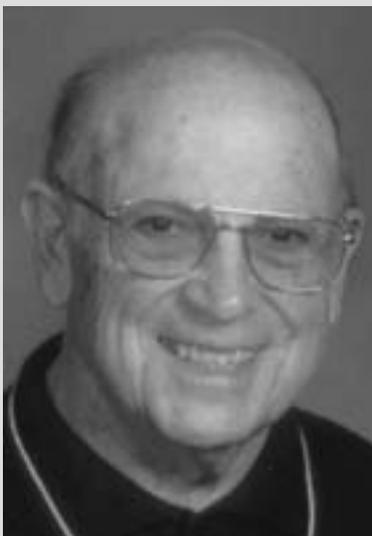
## International Librarian's Day observed



NASA photo by Dominic Hart

The NASA Ames library observed International Special Librarian's Day in April by demonstrating the most recently acquired electronic resources and databases used in the library today.

## Joseph L. Anaya Jr. passes on



Joseph Anaya passed away on March 7. Anaya worked approximately a quarter of a century at NACA and then at NASA. He was originally an aircraft mechanic and retired as an inspector. The projects that were his favorites there were the F-104 A and the Galileo. He traveled extensively on the Galileo project.

Anaya greatly enjoyed his work at NASA, as well as the relationships that he established there.

Anaya was preceded in death by his wife Frances. He remarried and he leaves behind his wife, Bernice, son Robert, daughter-in-law Janet and his two grandsons, Timothy and Daniel.

A memorial service was held at the Fair Oaks Presbyterian Church in Fair Oaks, Calif., on March 15.

## Event Calendar

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

**Ames Ballroom Dance Club**. Classes on Tuesdays. Begin classes at 6:15 p.m. Higher-level class meets at 5:15 p.m. Held in Bldg. 944, the Rec. Center. POC: Helen Hwang, hwang@dm1.arc.nasa.gov.

**Ames Bowling League**, Palo Alto Bowl on Tuesday nights. Seeking full-time bowlers and substitutes. Questions to sign up: Mike Liu at ext. 4-1132.

**Ames Child Care Center Board of Directors Mtg**, every other Thursday (check Web site for meeting dates: <http://acc.arc.nasa.gov>), 12 noon to 1:30 p.m., N-215, Rm. 212. POC: Tom Maier, ext 4-3643.

**Ames Contractor Council Mtg**, first Wednesday each month, 11 a.m., N-200, Comm. Rm. POC: Anita Fogtman, ext. 4-4432.

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

**Ames Federal Employees Union (AFEU) Mtg**, third Wednesday of ea. month, 12 p.m. to 1 p.m., Bldg. 19, Rm 1042. Info: <http://www.afeu.org>. POC: Marianne, ext. 4-4055.

**Ames Mac Support Group Mtg**, third Tuesday of ea. month, 11:30 a.m. to 1 p.m., Bldg. N262, Rm 180. POC: Julie ext. 4-4694 or 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.

**Ames Sailing Club Mtg**, 2nd Thurs of ea. month (Feb through Nov), 11.30 a.m. - 1 p.m. Bldg. 223, Ames Visitor Center & Gift Shop, special events room. All are welcome. POC: Jeff Smith, ext. 4-2586.

**Environmental, Health and Safety Information Forum**, first Thursday of each month, 8:30 a.m. to 9:30 a.m., Bldg. 221/Rm 155. URL: <http://q.arc.nasa.gov/qe/events/EHSseries/> POC: Julie Morsellino at ext. 4-6810.

**The Hispanic Advisory Committee for Excellence HACE Mtg**, first Thurs of month in N255 room 101C from 11:45 a.m. to 12:45 p.m. POC: Eric Kristich at ext. 4-5137 and Mark Leon at ext. 4-6498.

**Jetstream Toastmasters**, Mondays, 12 p.m. to 1 p.m., N-269/Rm. 179. POC: Cathy Payne at ext. 4-0003.

**Model HO/HOn3 Railroad Train Club**, Bldg. 126, across from south end of Hangar One. Work nights: usually Fridays, 7:30 p.m. to 9:30 p.m. Play time: Sundays, 2 p.m. - 4 p.m. John (408) 735-4954 (W) or (408) 281-2899 (H).

**Nat'l Association of Retired Federal Employees (NARFE)**, Former and current federal employees. Your only contact with Congress. Join to protect your federal retirement. Chptr #50 meets the first Fri. of each month at HomeTown Buffet, 2670 El Camino (at Kiely), S. Clara, 11 a.m., lunch \$6.70, Spkr. 12 noon Spkr. April 4: Visit by CA State President of NARFE. POC Earl Keener (408) 241-4459 or NARFE 1-800-627-3394.

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

## Professional dance taught at Ames' evening classes

The Ames Ballroom Dance Club, with more than 60 members, meets every Tuesday evening starting at 5:15 p.m. in Building 944 on Edquiba Road across from McDonalds and NEX II.

The club offers professional instruction in beginning and intermediate level ballroom/nightclub dances such as East Coast and West Coast Swing, Hustle, Nightclub Two-Step, Waltz, Foxtrot, Tango, Cha Cha, Rumba, Bolero and Salsa. It also hosts dance excursions, review parties and the elegant holiday ball in December. Come try it out. Your first lesson is free. Quarterly dues are \$30. Drop-in rate is \$5. Open to all resident staff and their sponsored guests.

For information, contact Rosalyn Jung at [Rosalyn.Jung@nasa.gov](mailto:Rosalyn.Jung@nasa.gov).



NASA photo by Rosalyn Jung

Ames employees during one of the Ames Ballroom Dance Club classes.

## NASA partners with teacher institute

*continued from front page*

will begin this summer with an intensive two-week program for teacher participants and will continue throughout the school year with monthly reinforcement sessions, classroom visits and an on-line interactive Web site.

Participating teachers will share what they learn by training other third through fifth grade teachers in their districts. A project-based curriculum approach will be used to help teachers learn science, mathematics and technology while engaged in hands-on projects. The goal will be to increase teachers' STEM content knowledge and pedagogical skills and at the same time ignite a passion and inquisitiveness in teachers about science and mathematics.

The teacher institute is implemented by the Collaborative for Higher Educa-

tion, a partnership of public higher-education institutions in Silicon Valley - San José State University, the University of California at Santa Cruz and the Foothill and De Anza community colleges. The collaborative works closely with Ames and ultimately will be located in the NASA Research Park located at Ames, a world-class, shared-use research and development campus in association with academia, industry and non-profit organizations.

The collaborative's vision is to create a statewide model of higher-education institutions working together with a seamless delivery of educational services in math, science, engineering and technology. The collaborative is committed to addressing workforce development and filling the student pipeline

in science, technology, engineering and mathematics.

"During the two-year project, it is estimated that over 3,500 students will benefit from the new STEM knowledge acquired by the teachers in this program. As these teachers continue to teach, thousands of additional students will be impacted as well," said Nancy Bussani, executive director for the Collaborative for Higher Education. "We're delighted the House Family Foundation has chosen to support this program."

For more information about the NASA education program, visit the Web at: <http://education.nasa.gov/>

BY MICHAEL MEWHINNEY

## Ames Classifieds

Ads for the next issue should be sent to [astrogram@mail.arc.nasa.gov](mailto: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!

## Housing

For sale: charming creekside townhome, 5 minutes from Ames. Serene setting with redwoods, 2bd/2.5 ba, 1,614 sq ft., skylights, 2 fireplaces, all new kitchen appliances, lots of storage. Nicely designed, open layout. Best of all: no commute! \$529K. Call (408) 998-1069.

Mountain View, 2bd/1ba, 800 sqft House, 1/2 mile from downtown, very clean, W/D, large yard, pets OK, garden, \$1,400/mo. Call (650) 961-1457.

For sale: 3 bd/2ba home in Santa Cruz Mountains. Finished half-basement. New paint inside and out, remodeled 2nd bath. Convenient 30 min commute to Ames. 3+ acres with redwoods, fruit trees, walnut tree. ISDN as primary phone, with router; secondary analog phone line also. Satellite dish/receiver. 2-horse barn with hay loft and tack room, other bldgs. \$625K. Virtual tour at [www.loristrusis.com](http://www.loristrusis.com). Call (831) 461-9476.

Family with 2 kids (age 12 and 14) is looking for fully furnished house or apartment for rent or house-sitting during sabbatical leave from Germany (July 2003 to August 2004). 3 bedrooms required, location near Ames preferred. Call ((+49 34293 34689) or e-mail: [wendisch@tropos.de](mailto:wendisch@tropos.de)

Duplex, 2bd/1ba, gar. large back yard, pet OK. In Mt. View 5 min. to Ames. \$1,500 and deposit. Call (650) 962-8728, ask for Long.

One room for rent in 3 bd/2.5 ba townhouse w/ parking space. Bathrm shared w/one other tenant. Room has balcony and closet. Vaulted ceilings, W/D, dishwasher, and BBQ on patio. 10 min walk to Ames, downtown mountain view. \$650 a mo. (w/first mo. rent and \$350 dep). Utills split equally. Lease pref'd but month to month ok. Rent negotiable for long-term leases. Contact: [normfung1969@yahoo.com](mailto:normfung1969@yahoo.com)

## Safety Data

	Civil Servants	Contractors
Not recordable first aid cases	3	1
Recordable no lost time cases	0	0
Lost time cases (Under new OSHA rules, lost time is defined as restricted duty and or days away from work (lost work days)	0	0
Restricted duty days	0	0
Lost work days	0	0

Data above is for March 2003.

## Miscellaneous

TV armoire and matching end table w/3drawers, stained honey-color finish, like-new \$65. Call (408) 295-2160.

Horses in need of good homes. Prices reduced. Striking, mellow Rocky Mtn Horse stallion, \$9,000. Gray Peruvian Paso gelding, \$5,000. Bay Peruvian Paso gelding, needs retirement home. Photos and info available at: [www.arliolimax.com](http://www.arliolimax.com). Call (831) 461-9476. Serious inquiries only please.

Diamond ring, single solitaire engagement ring in platinum setting and gold band. GIA certification. 0.7 carat, VS2 clarity, G color. Well under retail at \$2,500. Call (408) 368-6236.

Little Tikes race car bed and crib-size mattress, \$75. Christine (408) 244-9144.

Typewriter wanted for completing paper forms. Must be reliable and clean. Prefer correcting ribbon. Marion Hansen at (408) 252-8609.

Wanted, large refrigerator in good working condition for grammar school teacher's lounge, not much money to offer, will pick up if relatively local. Call (408) 863-1310.

## Transportation

'95 Tahoe LS: 108,000 miles. Power windows, locks, mirrors, driver seat and steering. Remote entry, privacy glass, AC and premium sound. Clean body, White, runs great. \$9,975. Sam (408) 242-4937 or e-mail at: [sethi\\_samir@yahoo.com](mailto:sethi_samir@yahoo.com)

## Car Pool

I am interested in carpooling from Berkeley to Ames up to five days a week. Work hours are 7:30 a.m. to 4:30 p.m. Would like to share riding/driving. Call Tenise at ext. 4-4916 or by email at: [teyoung@mail.arc.nasa.gov](mailto:teyoung@mail.arc.nasa.gov).

Car pool from Pleasanton. Contact Natalio Mingo, [mingo@nas.nasa.gov](mailto:mingo@nas.nasa.gov), ext. 4-1776 or Deepak Kulkarni, [kulkarni@ptolemy.arc.nasa.gov](mailto:kulkarni@ptolemy.arc.nasa.gov), ext. 4-4869.

Seeking one person to join car pool from Almaden Valley / New Almaden. Compressed schedule: 6:30 a.m. to 4:00 p.m. Call Dean Giovannetti at ext. 4-3871 or e-mail at: [dgiovannetti@mail.arc.nasa.gov](mailto:dgiovannetti@mail.arc.nasa.gov).

## Ames Retirements

Name	Code	Date
Dave Jones	SFB	02/03/03

## Ames Public Radio & Phone

1700 KHz AM radio -- information announcements and emergency instructions, when appropriate, for Ames employees. The emergency information phone number for Ames is (650) 604-9999.

## VPP STAR Tip

*Employees interviewed perceive safety rules and safe work practices as being for their protection, well-being, and benefit.*

*...Margaret Richardson, in Preparing for the Voluntary Protection Programs, Copyright © 1999 by John Wiley & Sons*

## 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. Make your reservations for Chase Park

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

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

**Visitor Center Gift Shop N-223**

(10 a.m. to 4:00 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 web site for 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.

## Vacation Opportunities

Lake Tahoe-Squaw Valley townhse, 3bd/2ba. View of slopes, close to lifts. Per night \$250, two night min. Includes linens, cleaning, propane fireplace, fully equipped. Call (650) 968-4155, [DBMcKellar@aol.com](mailto:DBMcKellar@aol.com)

South Lake Tahoe Cottage w/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. 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 lovely canyon setting. Fully eqpd kitchen. Access to priv. beach. Tub in patio gdn. Halfway between Carmel & Big Sur. \$175/night for 2; \$225 for 4 and \$250 for more, plus \$150 cleaning dep. Call (650) 328-4427.

Incline Village: Forest Pines, Lake Tahoe condo, 3 bd/2 ba, sleeps 8. Fireplc, TV/VCR, MW, W/D, jacuzzi, sauna, pool. \$120/night low season; \$155/night high season. \$90 cleaning fee and 12% Nevada room tax. Charlie (650) 366-1873.

Tahoe Donner vacation home, 2 bd/2ba. trees, deck, sun, fun. Access to pools, spa, golf, horseback riding, \$280 wkend, \$650 week. Call (408) 739-9134.

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.

## 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](mailto:astrogram@mail.arc.nasa.gov) on or before the deadline.

Deadline:	Publication:
April 29	May 2003
May 28	June 2003
June 27	July 2003

## Safety meetings scheduled

The following environmental, health and safety meetings for 2003 will be held the first Thursday of every month from 8:30 a.m. to 9:30 a.m., in Building 221; Room 155.

- May 1  
ChemWatch  
by Janeen Robertson
- June 5  
Motor pool initiatives (bio diesel, electric cars, etc.)  
by Purcell Hamilton



- July 10  
EMS, Sustainability and LEED,  
by John Scarboro and  
Christel VanArsdale
- Aug. 7  
Hazardous waste disposal,  
by Erik Rockwell
- Sept. 4  
Buying CPG via store stock  
by Janice Stanford (JFS)

- Oct. 2  
Non-ionizing radiation  
(i.e. lasers, radar, UV lights)  
by Ted Ward
- Nov. 6  
Storm water pollution  
prevention  
by Christy Ray-Hagenau

- Dec. 4  
US EPA Performance Track  
by Christel VanArsdale

For more information about the meetings, visit: <http://q.arc.nasa.gov/qe/events/EHSseries/> or contact Julie Morsellino at ext. 4-6810.

## STS-107 memorial items displayed



NASA photo by Tom Trower

Various people, primarily children from surrounding school districts, sent or dropped off posters, photos and letters of condolence at the front gate of NASA Ames in response to the recent STS-107 tragedy. The display seen here is a collage of just some of the items that were received at Ames. The items have since been forwarded to Johnson Space Center to be included in the STS-107 memorial there.



National Aeronautics and Space Administration

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