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Dreams are creating a future, new NASA spaceship

"There is nothing like a dream to create the future." -- Victor Hugo, 19th-century author of The Hunchback of Notre Dame and Les Misérables

More than a century after they were written, Hugo's words apply to today's dreams of advanced human space travel.

What once was only a dream that envisioned a new spaceship that would fly astronauts back to the moon and beyond is now taking small steps toward reality as NASA's Constellation Program takes shape.

Small-scale models of the new Crew Exploration Vehicle (CEV) capsule and its tall rocket -- the Crew Launch Vehicle (CLV) -- are being tested in NASA wind tunnels across the nation at NASA Marshall Space Flight Center, Huntsville, Ala., here at NASA Ames and at NASA Langley Research Center, Hampton, Va.

The tests are supporting the initial development of NASA's new spaceship, its hardware and software. Wind tunnels use giant fans or high-pressure airflow to create wind to flow over vehicles, engines, rockets or scale models, to simulate flight performance. Researchers use such wind tunnel 'flights' to assess new geometric configurations before incorporating them into space vehicle designs.

NASA photo by Tom Trower

On March 7, local media visited Ames' Unitary Wind Tunnel Complex to view a scale model of the Crew Exploration Vehicle. Left to right: John Fowler, reporter, KTVU-TV Fox Channel 2 Oakland; Michael Mecham, Northern California bureau chief/Asia-Pacific bureau chief, Aviation Week & Space Technology magazine; Thomas Edwards, Ames director of aeronautics; and James Bell, Code APS.

From Feb. 20 through Feb. 22, Ames conducted a test of a 0.5 percent scale model of the CLV and CEV in launch configuration in its 11-foot wind tunnel. From Feb. 22 through March 3, engineers tested a larger model of the CEV in Ames' 9-foot-by-7-foot supersonic wind tunnel and in the 11-foot wind tunnel to study re-entry flight characteristics.

"We think this test will be useful for NASA engineers in making technical decisions regarding possible configurations for the new vehicle," said Don Nickison, a NASA Ames engineer in charge of wind tunnel tests involving the new spaceship. "I would expect, as the design matures, that we will be ready and willing to support validation wind tunnel tests for heat shields, parachutes and other systems associated with this new vehicle."

"It's exciting because it's the kind of work that NASA is stressing now," Nickison added. "We're always very happy to be of support to the rest of the team at NASA, including NASA's Johnson Space Center, Houston and other NASA centers across the country."

In December, Marshall conducted the first wind tunnel tests on a 16.5-inch scale model of the CEV/CLV in a 48-inch-long, 14-inch-by-14-inch cross section wind tunnel. The tests demonstrated NASA engineers' ability to 'fly' a craft on the ground to assess new geometric configurations before designs are incorporated into more sophisticated models.

continued on page 5

Ames' contributions to STS-1: the greatest test flight in history

Editor's note: On April 25, NASA will mark the 25th anniversary of STS-1, the first orbital flight of the space shuttle. The article below originally was published in the April 9, 2001 issue of the Astrogram. It has been modified to mark this year's anniversary

This April 12 marks a historic milestone on two continents in the human exploration of space. It is the 45th anniversary of the flight of Soviet cosmonaut Yuri Gagarin, the first human to orbit the Earth. It also is the 25th anniversary of STS-1, the first orbital flight of the Space Transportation System, or space shuttle. This truly remarkable achievement - hailed by NASA as the greatest test flight in history -- was the result of work by thousands of individuals throughout NASA, and by major portions of the aerospace industry and academia as well.

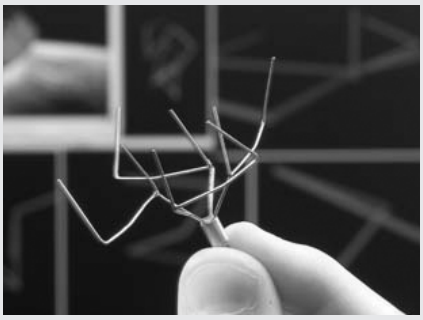
STS-1 was the first piloted flight using solid rocket boosters, and the first U.S. space vehicle to carry a human crew on its maiden flight. STS-1 and the three flights following were engineering test flights to prove the space shuttle system in launch, orbital and landing operations. STS-l's flight profile was designed to minimize structural and operational loads on the spacecraft and its boosters. Columbia's cargo bay was empty except

continued on page 6

On the Inside . . .

'Borg' computer collective designs NASA space antenna

Like a friendly, non-biological form of the Borg Collective of science fiction fame, 80 NASA Ames personal computers, using artificial intelligence (AI), have combined their silicon brains to quickly design a tiny, advanced space antenna.



One of the small space computer-designed antennas recently flown aboard the Pegasus XL rocket.

Three of these computer-designed space antennas began their trip into space in March, when an L-1011 aircraft took off from Vandenberg Air Force Base in California. The airplane dropped a Pegasus XL rocket into the sky high above the Pacific Ocean. The rocket ignited and carried three small Space Technology (ST5) satellites into orbit.

Each satellite is equipped with a strange-looking, computer-designed space antenna. Although they resemble bent paperclips, the antennas are highly efficient, according to scientists.

"This is the first time an artificially evolved object has flown in space," observed Jason Lohn, who led the project to design the antennas at NASA Ames.

The three 'microsats,' each no bigger than a typical TV, weigh only about 25 kilograms (55 pounds) each. Slightly bigger than a quarter, each antenna, able to fit into a one-inch space (2.5 by 2.5 centimeters), can receive commands and send data to Earth from the satellites. Together, the spacecraft are helping scientists study magnetic fields in Earth's magnetosphere.

The magnetosphere is a region enveloping the Earth. Charged particles are trapped in the region, which is influenced by Earth's magnetic field.

To design the ST5 space antenna, the computers started with random antenna designs and through the evolutionary process, refined them. The computer system took about 10 hours to complete the initial antenna design process.

"The AI software examined millions of potential antenna designs before settling on a final one," said Lohn. The software did this much faster than any human being could do so under the same circumstances, according to Lohn. "Through a process patterned after Darwin's 'survival of the fittest,' the strongest designs survive and the less capable do not."

"We told the computer program what performance the antenna should have, and the computer simulated evolution, keeping the best antenna designs that approached what we asked for. Eventually, it zeroed in on something that met the desired specifications for the mission," Lohn said.

"Not only can the software work fast, but it can adapt existing designs quickly to meet changing mission requirements," he said. Following the first design of the ST5 satellite antenna, NASA Ames scientists used the software to 're-invent' the antenna design in less than a month to meet new specifications - a very quick turn-around in the space hardware redesign process.

Scientists also can use the evolutionary AI software to invent and create new structures, computer chips and even machines, according to Lohn. "We are now using the software to design tiny microscopic machines, including gyroscopes, for spaceflight navigation," he ventured.

Four NASA Ames computer scientists spent two years developing the AI evolutionary program. It can operate on as many as 120 personal computers, which work as a team. The scientists wrote the AI software to create designs faster than a human being could.

"The software also may invent designs that no human designer would ever think of," Lohn asserted. In addition, the software can plan devices that are smaller, lighter, consume less power, are stronger and more robust among many other things - characteristics that spaceflight requires, according to Lohn.

The Exploration Systems Mission Directorate at NASA Headquarters, Washington, funded development of NASA evolutionary software. Detailed information is on the Internet at: http://ic.arc.nasa.gov/projects/esg Space Technology 5 satellite details are on the Internet at: http://nmp.jpl.nasa.gov/st5

BY JOHN BLUCK

SpaceWorld reveals future plans

NASA photo by Trish Guerrieri

Seth Shostak, SETI Institute and SpaceWorld Foundation board member, spoke to a crowd of more than 200 at the SpaceWorld and NASA Ames event held at Ames on March 16. The purpose of the event was to celebrate the Space Act Agreement under which the SpaceWorld Foundation will create SpaceWorld at NASA Ames. This event was for the community and presented the concept for SpaceWorld at NASA, including drawings of the plans for the facility. The theme of SpaceWorld at NASA will be exploring and mapping the solar system, also the theme of Shostak's talk. SpaceWorld at NASA plans to open in early 2008.

Katrina survivor shares story of resolve and rebuilding

A survivor of last year's devastating hurricane Katrina that roared across southern Mississippi and NASA's Stennis Space Center recently provided a first-hand account of her experience to Ames employees.

Diane Sims, an employee in the Stennis legal office, shared her experiences with a standing-room-only crowd in the Space Sciences auditorium. Sims also serves as the Stennis coordinator of the Families Helping Families effort to connect interested Ames personnel with colleagues needing assistance as they recover from Katrina.

NASA photo by Dale Cruishank

Ames' Yvonne Pendleton and Wendy Dolci flank Diane Sims from Stennis.

"It's a flip of the coin; it could be us," remarked Ames scientist Yvonne Pendleton in welcoming Sims to Ames. Pendleton, along with Wendy Dolci, created the Families Helping Families program. She described the aftermath of hurricane Katrina as "a tragic but uplifting story" that has brought her and other Ames employees closer to their colleagues at Stennis.

Dolci noted that 45 Ames employees and families have "connected on a personal basis" with families at Stennis. She added that while Ames has provided material and emotional support to the hurricane survivors, the people at Stennis also "have provided us with a great perspective" on dealing with and surviving a catastrophic event.

Sims began her story by noting that "It is a blessing to work with" the people of Ames and "the Stennis families. We are so touched by your benevolence," she said. "We hope we never have to reciprocate, but we will be there if you need us."

Sims noted that unlike the earthquakes that menace the Bay Area, hurricanes typically give plenty of warning of their pending arrival. Three days before Katrina was predicted to make landfall, Sims reviewed her emergency preparations check-list, bought extra food, water, fuel and other supplies, filled up her car's gas tank and got extra cash from the bank. The next day, she secured outdoor items that would become airborne when the hurricane hit, and filled bath tubs and other containers with water to be used for drinking, bathing, washing dishes, etc. With the inevitable outage of electricity, her well's pump would be useless for pumping water.

Because her husband was working overseas, she and her daughter prepared their home, then they, Sims' sister and family, all relocated to their parents' home in Picayune, Miss., some 45 miles from the coast of the Gulf of Mexico, to ride out the storm.

On Monday morning, Aug. 29, Katrina was downgraded to a Category 4 storm, although the storm surge was still at category 5. At 9 a.m., the power went out, but the family's generators provided electricity for critical needs. The winds snapped trees like matchsticks, and power lines were down everywhere as the hurricane roared through the area. At 11 a.m., the eye of the hurricane passed over Picayune for 45 minutes. Although she was stunned to see the devastation wrought by Katrina in her neighborhood, "This was nothing compared to the devastation we would see in days to come," Sims noted.

Sims recalled that for her, the lack of communications and the relentless heat were the most frustrating. Telephone lines were down, and cell phones worked only sporadically, most often allowing only text messaging. She borrowed a satellite phone to contact the legal office at Marshall Space Flight Center, asking colleagues there to let friends and family out of the area know she and her family were OK.

Meanwhile, Stennis Space Center was providing emergency shelter to 3,000 employees and evacuees from the surrounding area. After a tornado damaged the roof of the administration building housing the evacuees, water poured in. One member of the legal staff almost single-handedly moved computers, files, wall decorations and anything else she could to a lower floor that was still dry. The legal office didn't return to its usual quarters until the end of February.

Sims reported that many homes, which looked to a casual observer to have escaped unscathed, were found to have 3-1/2 feet of sewer water in them. Everything had to be removed and replaced, and the entire interiors gutted. Homes, churches, businesses, banks - all were severely damaged or destroyed. Fortunately, Picayune is far enough from the coast that it escaped the storm surge that ravaged areas closer to the sea. But the winds caused catastrophic damage, in some cases obliterating entire towns along the coast.

Because Sims and her family live near a large lake, they were able to wash dishes and bathe in the lake, an experience she likened to "the camping trip from hell." Nonetheless, she frequently reiterated how fortunate she and her family are to have been spared even worse property destruction. Schools were closed for at least a month; some remain closed even now. Some students were sent to live with relatives in other states so they could attend school. Sims' home was without power for 3 1/2 weeks. Although she had generators to run fans, she said the stifling heat and humidity were nearly unbearable in an area heavily dependent on air conditioning.

Throughout her remarks, and despite the damage her home suffered, Sims recalled that she feels "so blessed" to live far enough from the coast that she was able to escape the flood waters. And she added that "It is a privilege to work for the federal government." While many in the hurricane zone lost their jobs, Sims said it was "a blessing to know our paychecks will keep coming" as they rebuild their homes and their lives after Katrina.

Last December, Ames employees shipped seven large containers of supplies - clothes, household items, appliances, tools and Christmas gifts - to their Stennis families. The Families-Helping-Families effort is not a NASA-funded

continued on page 9

Katrina and a 1906-magnitude earthquake:
-- comparisons and preparations

Bob Dolci, Ames' chief of protective services, director of emergency services and chief of the center's Disaster Assistance and Rescue Team (DART), spent three weeks at Stennis Space Center following hurricane Katrina. Recently, he offered a comparison between Katrina and the expected, eventual major earthquake in the Bay Area, as well as tips for preparing for a large earthquake.

Although at first glance Stennis and Ames seem to be very different - from locale to natural disasters and population size -- lessons learned from Katrina can help us prepare for the inevitable 'big one' that will strike the Bay Area some time in the future. Ames employees are well-advised to heed Dolci's suggestions, particularly as we approach the 100-year anniversary of the April 1906 quake.

"The responsibility is yours," Dolci stressed. "Don't expect to get help from the authorities for several days at a minimum. His message: plan ahead and be self-sufficient for at least several days.

Stennis, like Ames, is a joint-use federal facility with more than 30 resident agencies. Two days after Stennis was evacuated, NASA was supporting 1,000 NASA employees, 2,300 family members and 700 local evacuees. Stennis had generator power, local wells, local sewers and fuel - things Ames likely would not have in the aftermath of a major earthquake. The cafeteria at NASA Stennis served 9,000 meals / day with limited supplies, compared with the normal of less than 1,000 meals / day. The medical clinic was overwhelmed, trash management became a major problem and the center was unable to contact 65 percent of its employees during the first week following the hurricane. Dolci reported that 1,035 Stennis families were without livable homes, 200 NASA families had no homes and most lost everything. Similar problems, but on a much larger scale, are to be expected in the aftermath of a major earthquake.

The population of Mississippi is 2.9 million; the Federal Emergency Management Agency (FEMA) and the Mississippi EMA (MEMA) supported a population of fewer than 300,000 over a six-county area. There were fewer than 600 total Katrina fatalities. With a Bay Area population of 7 million in 10 counties and 60 cities, FEMA, the California Office of Emergency Services, and local response agencies probably would be faced with significantly more fatalities than those caused by Katrina. Depending on the source, estimates of Bay Area fatalities range from a high of 6,000 to a high of 15,000. Those are worst-case scenario figures and are fault rupture and time of day dependent. The predicted number of people requiring hospitalization could range from 150,000 to 450,000. Uninhabitable residences would likely exceed 150,000. Because there is a strong potential for devastating fires, the number of residences destroyed could be far higher. A 7.9 magnitude earthquake can result in as many as 750,000 individuals being homeless or without acceptable living conditions. Millions may be without water, power or sanitation.

There were minimal hotel / motel rooms available in the Stennis area, and three of the four local communities lost up to 70 percent of their businesses. The nearby town of Waveland, Miss., suffered a catastrophic damage rate of 80 percent. Gulfport and Biloxi, Miss., fared only slightly better. Similarly, hotel rooms in the Bay Area, although more plentiful, also would be inadequate to house the number of displaced residents. And entire areas are expected to be wiped out or severely damaged following a large earthquake, either from structural damage or fires.

Screenshot of a section of the front page to the Web site https://disasterhelp.gov/portal/jhtml/index.jhtml

Stennis became the prime logistics staging area and operational staging area for six counties, providing support for some 50,000 people. It included: 33 commodity distribution centers, six emergency fuel stations, six disaster medical assistance teams, one disaster mortuary, 10 emergency shelters and 40 fire stations. Five hundred 18-wheel trucks delivered millions of tons of ice, water and MREs (military meals ready to eat). In the first week alone, nearly 20 millions tons of ice, 2.6 million gallons of water and 1.8 million MREs were delivered. A month later, FEMA and MEMA had distributed 40 million tons of ice, 5.5 million gallons of water, and 2.75 million MREs. FEMA / MEMA managed four base camps, an airfield and five military camps at Stennis, caring for 4,000 emergency responders and 7,000 military responders. So many MREs were distributed that no more were available, save those always held in reserve for the U.S. military. Clearly, there will not be enough MREs to feed all the people in the Bay Area who will need food following a huge earthquake.

In addition to dealing with problems at Ames / Moffett, we will need to support the broader relief effort as well. Ames / Moffett will likely become a local focal point for Bay Area disaster relief, and the Moffett airfield is likely to be the only airfield in the Bay Area to survive a major earthquake.

Given the potential magnitude of the damage, "Citizens should not expect much support from municipalities," Dolci stressed. Nor should residents expect support from FEMA for at least

continued on page 16

Educator astronaut Dottie Metcalf-Lindenburger returns to class

After a two-year hiatus from the classroom, educator astronaut Dottie Metcalf-Lindenburger made a triumphant return to the classroom in her first speaking engagement as one of NASA's newest astronauts.

NASA photo by Jonas Dino

Educator astronaut Dottie Metcalf-Lindenburger spoke recently at Johnson High School in Cheyenne, Wyo.

In a tailor-made fit, two of NASA's education programs, educator astronaut and Explorer Schools, joined forces in February at Johnson Junior High School in Cheyenne, Wyo., to inspire students to reach for their dreams. Johnson Junior High School was selected as a 2005 NASA Explorer School (NES) and began the program last fall.

"Watching Dottie interact with the students, it was obvious that she is a teacher," said Tom Clausen, manager for K-12 education at NASA Ames. "She knew her audience and delivered a presentation that related directly to the students."

In her presentations, Metcalf-Lindenburger related how astronaut training was like going through school. The past two years as an astronaut candidate were like 'elementary school,' learning the basics and preparing a solid foundation for the future. After graduating on Feb. 10, 2006 and earning the title 'astronaut,' she was now in 'junior high.' Here she is building on her foundation as she waits for her turn to fly in space, 'high school.'

Metcalf-Lindenburger talked about how she learned about the educator astronaut program. Spurred on by a student's question about how astronauts go to the bathroom in space, she logged on to the Web site www.nasa.gov and learned about the program. The rest is history.

Thousands of teachers applied for the program and of the thousand-plus viable applications reviewed at Johnson Space Center, Metcalf-Lindenburger was chosen along with Joseph Acaba and Richard Arnold.

After lunch, with a smaller, more intimate group of 25, Metcalf-Lindenburger was in her element. The students were challenged to design a vehicle that could transport a payload of paperclips using balloons, straws, paper cups and tape. She engaged the students in active learning and inquiry and the students responded with enthusiasm and creative design solutions.

"Meeting the astronaut was like meeting a movie star. I really liked doing the rocket and payload experiment," said Jennifer, ninth grade student and essay winner. "It was all awesome."

The last event of a very long day was a presentation to sixth grade students from Johnson's 'feeder' schools. For this section, Mic Bowen, aerospace education specialist, joined Metcalf-Lindenburger in a dynamic discussion of science, exploration and the steps needed to achieve their goals.

"The whole NASA team from Ames pulled together to create a very exciting and accessible program for our students. We had nearly 1,000 students get a taste of what the future holds, and Dottie inspired them to believe they could all be part of it," said Kim Parfitt, NES team lead at Johnson.

Metcalf-Lindenburger was born in Colorado Springs, Colo., which was less than an hour from Johnson. Before being selected to join the astronaut corps, she taught science and was the cross country coach at Hudson's Bay High School, Vancouver, Wash. She currently lives in Houston with her husband, who is also a teacher.

Johnson Junior High School is one of five 2005 NES school teams that are supported by NASA Ames. Ames supports schools in 10 states throughout the western region, including Alaska and Hawaii.

For more information about the NASA education programs, visit: http://education.nasa.gov

BY JONAS DINO

Creating a future, new NASA spaceship

continued from front page

"The first series of tests provided the first experimental data on the aerodynamic characteristics of the Crew Launch Vehicle," said Lawrence Huebner, CLV aerodynamics panel chair. "We are using the data to understand launch performance, as well as for comparison with computational analyses during ascent to orbit."

Marshall engineers continued testing through mid-March. The tests will serve as a foundation for more rigorous testing in the spring and summer of the launch vehicle design. More tests will be conducted on larger models of the vehicle design in larger wind tunnel facilities at NASA's Langley Research Center near and at Ames.

For Ames, the tests are among the first steps in a program to assist in developing a new space travel system.

"NASA Ames is making its resources and expertise available for development of the Crew Exploration Vehicle and the Crew Launch Vehicle," said George Sarver, Ames' project manager.

"The NASA field centers are working together like we did in the past to develop the shuttle orbiter aerodynamic and aero heating databases," said Rob Calloway of NASA Langley. "Our analytical methods, used in concert with our wind tunnels, will ensure the flyability and survivability of the human-rated Crew Exploration Vehicle and the Crew Launch Vehicle."

Langley's tests of a CLV model were done earlier this month.

The Constellation Program at Johnson is responsible for developing the CEV and CLV. The program is also tasked to develop a new Cargo Launch Vehicle and related systems aimed at forming the basis for more ambitious exploration missions to the moon, Mars and destinations beyond. The program combines large and small transportation systems, surface and space-based infrastructures, and communications, science and robotic systems, enabling humans the capability to explore the solar system.

For more information about NASA's Constellation Program, visit: www.nasa.gov

BY JOHN BLUCK

Ames' STS-1 contributions: greatest test flight in history

continued from front page

STS-1 launched from KSC on April 12, 1981.

for a data collection and recording package and an aerodynamic coefficient identification package.

The primary STS-1 flight objective was to demonstrate safe launch into orbit and return to landing of Columbia and its crew. Secondarily, the flight verified the combined performance of the entire vehicle -- orbiter, solid rocket boosters and external tank -- through separation and retrieval of the spent solid rocket boosters. The flight also gathered data on the combined vehicle's aerodynamic and structural responses to the stresses of launch. At mission end, similar data were gathered on orbiter energy characteristics, such as cross-range steering capabilities, structural loads on entry, and performance of the silica-tile thermal protection system.

A major portion of the flight and detailed test objectives was aimed toward 'wringing out' orbiter hardware systems and their operating computer software, and toward measuring the overall orbiter thermal response while on orbit with payload doors open and closed. Still other test objectives evaluated the orbiter's attitude and maneuvering thruster systems and the performance of the spacecraft's guidance and navigation system.

Research at Ames played a key role in the development and evolution of the space shuttle program from the very beginning. The shape of the orbiter has its roots in the 'lifting body' research pioneered by "Sy" Syvertson, Ames' fourth director, and Al Eggers. Once its 1- to 2-week orbital mission is complete, the shuttle executes a de-orbit burn, which slows it for its descent into the atmosphere. Initial entry occurs at about Mach 25, or 25 times the speed of sound in air. During the high-speed portion of the entry, the vehicle holds a high angle of attack. It executes a 'blunt body entry' maneuver pioneered by Ames' second director, H. Julian "Harvey" Allen for the Mercury / Gemini / Apollo programs. After a long and fiery entry, the vehicle continues to dissipate energy through a series of S-turns. It then goes into subsonic flight and lands, unpowered, either at Dryden Flight Research Center or, as is most common today, at Kennedy Space Center (KSC). Astronaut pilots say the shuttle glides like a 'falling brick,' so being able to land unpowered is quite an achievement.

This article describes some of Ames' major contributions to the early development of the space shuttle leading up to STS-1, and it mentions a few of the many Ames employees whose contributions were crucial to the vehicle's development. These include contributions to the shuttle ascent aerodynamics / aerothermodynamics (a combination of aerodynamics and thermal effects), the thermal protection system (TPS) that prevents the orbiter from burning up during reentry, low-speed approach and landing technology and simulator research. The center's facilities that enabled these contributions also are briefly described.

Ames has supported space shuttle development and advancement for close to 40 years, beginning with the formation in the 1970s of a Shuttle Project Office, led by Victor Stevens and his deputy, Bob Nysmith. They managed projects at Ames at the request of Johnson Space Center, the program's lead center. Hans Mark, Ames' third director, played a key role in defining and directing Ames' involvement in the shuttle program. Various directorates at Ames provided staff and facilities to execute projects.

Aerodynamics of the Orbiter/Boeing 747 Ferry Configuration

One of Ames' first tasks was to understand the aerodynamics of the specially modified Boeing 747 used to ferry the orbiter from Dryden to KSC. The aerodynamics of the mated vehicles and the interference of flows between the vehicles had to be well understood prior to committing to design and flight. Understanding the separation process of the 747 and the orbiter was another requirement. Testing in Ames' 14-foot wind tunnel was a major contribution to the successful flight test of the 747 / full-scale orbiter model Enterprise.

Ascent Aerodynamics/Aerothermodynamics

Ames made a huge effort to develop the aerodynamics and aerothermodynamics for the shuttle. According to Victor Peterson, former deputy director of Ames, more than 50 percent of the wind tunnel testing conducted for the shuttle was done at Ames.

Nearly all the aerodynamic studies at Ames used the center's extraordinary collection of wind tunnels, including the 40-by-80-foot wind tunnel, 12-foot pressure wind tunnel, the 2-foot, 11-foot and 14-foot transonic wind tunnels, the 6-by-6 foot, 8-by-7-foot and 9-by-7-foot supersonic wind tunnels, and the 3.5-foot hypersonic wind tunnel. More than 10,000 hours of wind tunnel testing took place even before the award of the shuttle design and construction contract in 1972. More than 25,000 hours of wind tunnel testing occurred after this. Key contributors to the subsonic - supersonic elements of the activity included Richard (Pete) Peterson, Jake Drake, Dan Petroff, Jim Monford, Jack Bronson, Len Roberts and Jack Boyd.

Testing for the ascent stack (the orbiter, external tank and solid rocket boosters) aerodynamics and exhaust plume interactions was carried out in the 9-foot-by 7-foot supersonic section of Ames' Unitary Plan wind tunnel.

continued on page 7

Ames' STS-1 contributions: greatest test flight in history

continued from page 6

These tests helped engineers ensure that the aft portions of the vehicle were properly designed, and that they would safely function during ascent.

Other specialized aspects of Ames' wind tunnels were very helpful in the shuttle's development. A special rig in the center's 14-foot tunnel was used to study the aerodynamics of an abort maneuver implemented at transonic mach numbers. This rig also was used in the study of the mated / separating configurations between the Enterprise and the 747 carrier aircraft.

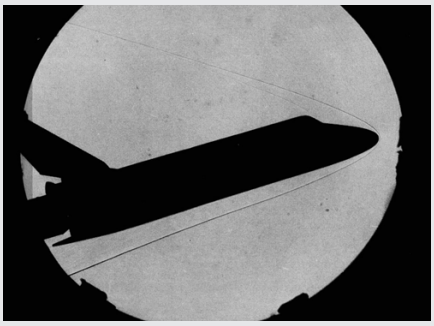
One of the most heavily used tunnels for shuttle testing was the 3.5-foot hypersonic wind tunnel, which was capable of simulating flight at Mach 5, 7 and 10. This facility provided about 47 percent of the total hours of wind tunnel testing at Ames. Many personnel were involved in this work, including Joe Marvin, Mike Horstman, Marvin Kussoy, Bill Lockman and Tom Polek. A 1.5 percent ascent stack configuration in the 3.5-foot hypersonic wind tunnel test section was tested at Mach 5. Another configuration tested in the 3.5-foot tunnel was secured to the sting by its tail, so the effects of protruding main engines and the orbital maneuvering system could be assessed. These studies led to the understanding of many different complex phenomena, including dynamics of shock-shock interactions caused from the proximity of the elements of the stack configurations, and the effects of split body flap deployments and turbulent flows.

Entry Aerodynamics and Aerothermodynamics

Before the space shuttle, most entry vehicles were relatively simple, blunt shapes with no aerodynamic control surfaces. The shuttle was to become the first airplane-like entry vehicle with movable control surfaces.

The 3.5-foot hypersonic wind tunnel contributed equally to both ascent and entry aerodynamics and entry aerothermodynamics. The figure above shows a shadowgraph of the side view of the orbiter at Mach 7. The fine lines enveloping the side view outline the front of a bow shock layer that forms over the vehicle. At higher Mach numbers, the bow wave is highly swept as shown in the figure, and the gases in this wave are shock-heated to very high temperatures. These shock-heated gases create an environment that would melt the surface of the vehicle were it made of materials such as aluminum or composites found in modern aircraft. Data and analyses from Ames' wind tunnel simulations later were used to refine methods for estimating the heating over the full-scale shuttle.

The entry aero / aerothermodynamics of the shuttle were performed before the advent of modern 3-dimensional real-gas computational fluid dynamics, a later accomplishment led by Ames. In the 1970s, personnel including John Howe, Chul Park, Dave Stewart, John Rakich and Mike Green, working under the leadership of Dean Chapman, Vic Peterson and Howard Larson, used clever, approximate analytical tools, experimental results and engineering judgment to model the aerodynamic forces, heating rates and heating loads to understand the shuttle entry flow environment. This knowledge was required for the development of the shuttle TPS, another area of key contribution by Ames.



Shadowgraph of flow about the shuttle orbiter at Mach 7 showing the bow shock wave.

Thermal Protection System Contributions

The shuttle's thermal protection system prevents the vehicle from burning up from the searing heat of hot gases that exist within a bow shock layer that envelops the vehicle as it re-enters Earth's atmosphere. These gases reach temperatures as high as 25,000 degrees F, and heat the surface of the vehicle to as much as 3,000 degrees F. The vehicle enters the atmosphere at an angle of attack of about 40 degrees. Key participants in this research included Howard Goldstein, Dan Leiser, Marnel Smith and Dave Stewart.

In the early 1970s, Ames and JSC evaluated a large number of candidate TPS materials for the space shuttle orbiter in their arc jet facilities. Among these new types of heat shield materials was the LI-900 silica tile system developed by Robert Beaseley and his team at Lockheed Missiles and Space Company (LMSC), Sunnyvale, and several other conceptually similar systems developed by other companies. In order to understand why the various tile materials performed as they did in arc jet testing, Ames began a tile analysis research program, which rapidly turned into a tile development program. When the LI-900 tile system was chosen as the baseline in 1973, Ames had already begun to make significant contributions to the rapidly improving technology.

Ames showed in that same year how the purity of the silica fibers used in the tiles controlled their temperature capability and lifetime. In 1975, Ames invented the black borosilicate glass coating called Reaction Cured Glass that was adopted by LMSC and the shuttle program in 1977 and that now covers two-thirds of the orbiters' surface. This coating provides a thermally stable high-emmitance surface for the tiles, which serves to radiate away heat and allows the tiles to be manufactured to the demanding tolerance required. The coating covers the tile, which is made by bonding pure silica high temperature-resistant fibers. The finished tile substrate is similar in appearance and density to Styrofoam, but its thermal properties are such that the surface can be glowing white hot at over 2,300 degrees F and the back face of the tile never exceeds 250 degrees F, only a few inches below the surface. These remarkable heat-resistant tiles enable the space shuttle orbiter, which is essentially an aluminum airplane, to fly at hypersonic speeds.

In 1974, Ames invented the tile now known as LI-2200, which is stronger than LI-900 and contains silicon carbide to provide improved temperature capability. Adopted in 1978, this new tile replaced about 10 percent of the baseline LI-900 tile system on the first orbiter, Columbia, when a critical tile strength problem was encountered. Later, in 1977, Ames invented a new class of tiles called Fibrous Refractory Composite Insulation (FRCI 12). In 1980, it replaced about 10 percent of the earlier LI-2200 and LI-900, providing a more durable TPS and saving about 500 pounds of the overall TPS weight.

Hot gas flow between the tiles during atmospheric entry was considered a serious problem during orbiter development. In response, Ames developed a

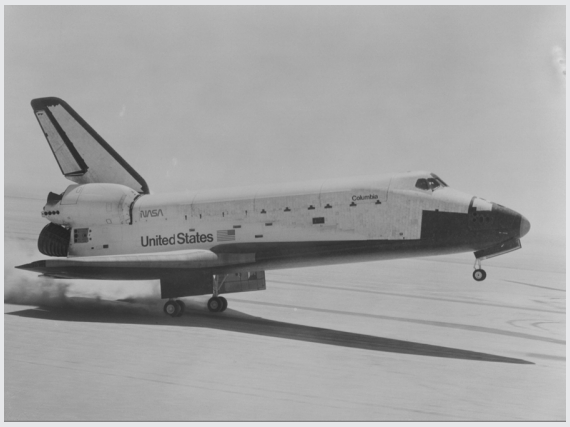
continued on page 8

Ames' STS-1 contributions: greatest test flight in history

continued from page 7

gap filler, which consists of a ceramic cloth impregnated with a silicone polymer that was adopted as a solution to the gap heating for Columbia. The Ames gap filler was so successful that it was adopted as a permanent solution to the gap flow problems on all the orbiters. More than 10,000 are now used on each vehicle.

On the leeward side of the orbiter, gases are much cooler during entry. At first a low- temperature, reusable surface insulation (LRSI) tile developed by LMSC was used. Ames (with Johns Manville) developed a flexible silica blanket insulation called Advanced Flexible Reusable Surface Insulation (AFRSI) that replaced most of the LRSI on the last four orbiters (Challenger, Atlantis, Discovery and Endeavour) and was retrofitted to Columbia.



The successful landing of Columbia at Dryden Flight Research Center April 14, 1981.

Arc Jet Facilities Simulate Entry Heating

Ames has a long heritage in the development of arc jets, tracing to the earliest days of NASA. These facilities are used to simulate the entry heating that occurs for locations on the body where the flow is brought to rest (the stagnation point, typically on the nose cap, wing leading edges and on the acreage of the vehicle). Simulations have to run from a few minutes to tens of minutes to understand the TPS materials' response to the hot gas flow environment. To support shuttle development, Dean Chapman and others led the effort to upgrade Ames' capability. Ames' facilities group, including Howard Stein, Warren Winnovich and Frank Centolanzi, implemented the upgrades. Ames' 60- megawatt Interaction Heating Facility was brought on line in the mid-1970s. High-pressure air passes through the constricted arc heater (invented by Ames), where a 'standing lightning bolt' is created and about 50 percent of this energy is deposited as heat into the flowing gas. The heated gases are expanded through either conical nozzles for stagnation point and wing leading edge testing, or through semi-elliptical nozzles for acreage tests. Ames' capability of being able to test a 2-foot-by 2-foot section of the acreage tile field in conditions duplicating aeroconvective heating and reacting boundary layer chemistry during simulated entry conditions was a critical element in the development of the shuttle TPS.

Low-Speed Descent Aerodynamics

Early shuttle concepts had orbiters that would have exhibited less than ideal aerodynamic characteristics upon return to Earth. This could have lead to poor handling qualities, especially during approach and landing. Personnel at Ames with expertise in guidance and control tackled the challenge of developing concepts that might compensate for deficient aerodynamics and ensure adequate handling qualities.

Still glowing red hot from its high-speed entry, the orbiter slows and descends into the supersonic / transonic / subsonic regime of its return. Again, Ames' wind tunnels played a key role in defining shuttle aerodynamics and design of the orbiter. The 2-foot transonic wind tunnel, with its capability up to Mach 1.4, was used to study potentially troublesome panel flutter problems. The 12-foot pressurized wind tunnel was used to investigate the orbiter's low-speed handling characteristics.

Ames' efforts demonstrated that unpowered landings could be made at speeds of at least 200 knots without significant problems. The 12-foot wind tunnel was used to define the aerodynamics of a specially modified Gulfstream 2 (G2) business jet with direct-lift flaps and side force generators. This vehicle was used for flight tests and astronaut training. Ames' Convair CV 990 and the G2 aircraft were used to prove that the orbiter did not need a subsonic engine for fly-around landing capability, an important finding that avoided having to pay the weight penalty of hauling a landing engine, its fuel and supporting subsystem to orbit and back. The Gulfstream, now known as the STA (Shuttle Training Aircraft), is used to this day by pilot astronauts for in-flight proficiency training.

Finally, an awesome 36 percent scale model of the orbiter, 44 feet long, was fabricated and tested in Ames' 40- by 80-foot wind tunnel. This model and the 40-foot-by-80-foot wind tunnel could create Reynolds numbers slightly higher than the 12-foot pressurized wind tunnel. An important purpose of the 40-by-80-foot testing was to identify the influence of the TPS on the orbiters' low-speed aerodynamics. This model still exists, painted with the striking black underbelly and white top. It is proudly displayed in front of the former Ames Visitor Center, near the 40-foot-by-80-foot wind tunnel where it was so intensely tested.

Approach/Landing Systems Development: FSAA

Landing simulation research for the shuttle orbiter began in the very early 1970s, using the Flight Simulator for Advanced Aircraft (FSAA). The large motion envelope of the FSAA provided many of the vital cockpit accelerations that enabled pilot astronauts to experience a truer 'feel' of the g-forces of the orbiter during approach and landing. These simulations were conducted for that portion of the shuttle's flight from supersonic (following re-entry) to approach and landing.

For many years, prior to first flight, all the pilot astronauts who would eventually fly the orbiter spent many hours in the FSAA, identifying handling qualities that needed improvement, and control system shortcomings. In this process, the pilots gained invaluable training in the skills needed to successfully land the orbiter. It was in the FSAA that investigations were conducted that determined the need for the Heads-Up-Display (HUD), and its alphanumeric symbology that became the primary guidance system for orbiter landing.

A pilot-induced oscillation (PIO) problem arose on the first approach and landing test program flight in July 1977, with pilots Fred Haise and Gordon Fullerton. A PIO is a longitudinal 'porpoising' that worsens due to pilot over-control. It is generally not a piloting technique problem so much as a

continued on page 14

Fourteen-foot wind tunnel at Ames to be demolished

Ames' 14-foot wind tunnel is slated for demolition, starting this summer. This tunnel is part of the N218 complex and its features are plainly seen from the cafeteria, behind the volleyball courts.

NASA photo

The 14-foot wind unnel, part of the building N218 complex at NASA Ames. The wind tunnel is slated for demolition this summer.

This work is part of the 'renovation by replacement' effort in which older structures are demolished to create room for new structures. It's part of Ames' effort to minimize maintenance costs, clean up our environment, and to move forward with new facilities that better support the center's research efforts. The total demolition may take three years based on funding availability. The project is therefore divided into three phases.

Phase 1 is for the demolition of the tunnel structure visible from the cafeteria and demolition of the concrete structure facing 'C lane.' This is the work scheduled for 2006. The construction site will be enclosed in a perimeter fence. Construction access will be from Durand Road. Phase 1 work will have a duration of eight to 11 months, depending on how much work is awarded. The site, and the perimeter area, will be monitored for air quality, storm water runoff, and other environmental and safety concerns. A primary concern for the project team has been to define environmental and safety issues. Demolition methods will be selected by the contractor performing the work. Contract award will be by 'best value' evaluation to assure the government that the contractor performing the work is highly qualified.

The-14 foot wind tunnel was originally constructed with a 16-foot test section. It opened in December 1941 as the third wind tunnel at Ames. The tunnel design was a fairly conventional closed-throat, single-return design, but it was big for its speed. It operated close to the speed of sound, and its 27,000 horsepower electric motor was then the most powerful tunnel drive system anywhere. During the war, the tunnel was in operation almost constantly, notably testing new fighter aircraft like the Lockheed P-38, the Bell P-39, the Curtiss P-40 and the Republic P-47. The tunnel quickly proved its value in tests validating the NACA low-drag or laminar flow airfoils and in solving a duct rumble problem with the North American P-51. A virtual copy of the Ames 16- foot tunnel was soon built at Langley and there used mostly for propulsion tests.

Following a decade of service, modifications began in 1952 to push its speed into the transonic range. Its power was quadrupled to 110,000 horsepower, and it incorporated a flexible nozzle that could be adjusted to attain speeds between Mach 0.6 and 1.2. Most important, the test section was ventilated on all four sides to attenuate the reflection of shock waves. The 16-foot had cost less than $2 million to build in 1941, and the conversion cost more than $9 million by the time the tunnel reopened in late 1955. However, as a transonic tunnel it never regained its original usefulness. In part it was eclipsed, technologically, by the Unitary Plan wind tunnels that opened that same year. As the 14-foot tunnel, it was put to use solving problems of air inlets in supersonic aircraft and in tests of full scale missiles entering America's arsenal. The tunnel was mothballed in 1990, though reopened briefly in 1997 for some tests of the SOFIA.

The demolition project is being managed by Code PFE with design support by DMJMH+N, environmental surveillance by Code QE, safety monitoring by Code QH, and contract administration by Code JAZ.

Questions concerning this project can be addressed to Peter Goldsmith at Peter.T.Goldsmith@NASA.Gov.

BY PETER GOLDSMITH

Katrina survivor shares story of resolve and rebuilding

continued from page 3

program; it is based on one-on-one connections between individuals. Even the shipping costs were covered by private funds. "It was so emotional to see those cartons come off the truck," Sims said. "The Stennis recipients were so excited" to receive those expressions of support from people they had never met. Her presentation included pictures of many of the Stennis employees taking part in the program.

Sims noted that of the 4,500 employees at Stennis, one-third have no home or an extensively damaged home. Many are living in cramped FEMA trailers as they rebuild their homes in their free time.

She concluded her presentation by reiterating the importance of having an emergency checklist and of being prepared, and she offered the audience tips as to what to include in a personal emergency kit.

For more information about the Families Helping Families program, go to http://spacescience.arc.nasa.gov/katrina/ For more information about emergency preparedness, see the accompanying article.

BY ANN SULLIVAN

NASA Ames hosts NASA information access meeting

Ames welcomed NASA's Freedom of Information Act (FOIA) officers and staff to the annual agency-wide gathering in March. Seventeen access professionals from NASA Headquarters and the field centers met to review the latest practices and policies relating to the information disclosure law that aims to shed light on the government's activities. The meeting coincided with the American Society of Access Professionals (ASAP) training conference held in San Jose earlier in the week.

NASA photo by Dominic Hart

NASA access professionals pose for group photo at annual agency-wide meeting held recently at Ames.

A key topic discussed by conference participants was a recent presidential order. Late last year, President Bush signed Executive Order 13392, entitled 'Improving Agency Disclosure of Information.' The goal of the order, which all federal agencies must follow, is to improve FOIA-related service and performance, increase efficiency in the agency's information disclosure process, strengthen compliance under the statute and minimize potential litigation.

Executive Order 13392 accentuates how important access laws are to the functioning of our constitutional democracy. The new executive order is a prime example of 'citizen-centered' and 'results-oriented' policy. The order calls upon all federal agencies to discharge their FOIA responsibilities in an efficient, results-oriented manner and to achieve tangible measurable improvements when processing FOIA requests received from the public. The underlying principle is to ensure that the federal government's activities are held accountable to the tax-paying public.

Each federal agency has been tasked to appoint a chief FOIA officer at the administrator's level and to submit a report on this FOIA processing to the Department of Justice explaining how this executive order will be implemented at that particular agency.

The report will include improvements that need to be made to the agency's FOIA processing, along with milestones and timelines for each improvement.

NASA has appointed Assistant Administrator for Public Affairs David Mould as the agency chief FOIA officer. The agency has formed an ad-hoc team to compile the report with each field center given an opportunity to submit ideas and suggestions. Their report is due to the Justice Department in June 2006.

Ames is striving to improve FOIA handling and its response to the public, and the center's FOIA staff will be seeking your help to make Ames' operations more efficient and compliant with the executive order. For questions and suggestions regarding FOIA at Ames, please contact the center's FOIA coordinator Kelly Garcia, at ext. 4-3273.

BY KELLY GARCIA AND TERRY PAGADUAN

Ask the 'Protective Services Wizard'

Ames Fire Department and Fire Prevention Office roles

Question:

What are the roles and responsibilities of the NASA Ames Fire Department and the NASA Ames Fire Prevention Office?

Answer:

The NASA Ames Fire Department consists of 41 contract career firefighters. They operate daily with an emergency response force of 13 personnel, staffing an engine company, a two-piece truck company, a two-piece aircraft rescue fire-fighting company and a command vehicle. They deliver structural and aircraft fire-fighting services, emergency medical services, technical rescue services and hazardous materials response services on center. The NASA Ames Fire Department is also part of the Santa Clara County Local Fire Services and Rescue Mutual Aid Plan, for responding to off-center emergencies and receiving assistance at major on-center emergencies.

The NASA Ames Fire Prevention Office conducts fire/life safety inspections including permit issuance and facility fire and evacuation drills. It also provides fire/life safety analysis/evaluation, including plan review.

The office also works as consultants and conducts investigations for determining the origin and cause of fires at on-center facilities.

The Fire Prevention Office provides public fire safety education and awareness. Furthermore, the Fire Prevention and Protection Program supports both the NASA Ames Fire Department and the NASA Ames Occupational Safety, Health and Medical Services Branch.

If you have any questions regarding the NASA Ames Fire Department or the NASA Ames Fire Prevention Office, visit the Code JP Web sites for more information and points of contact: http://jp.arc.nasa.gov/ES/Ames_Fire.html and also http://jp.arc.nasa.gov/ES/Fire_Prevention.html

Do you have a question for the Protective Services Wizard? Then e-mail your question to kwalsh@mail.arc.nasa.gov.

Upcoming events

Founder of Seventh Generation Inc. to speak at Ames for Earth Day

The renowned environmental and corporate responsibility advocate Jeffrey Hollender will present at NASA Ames in April in celebration of Earth Day.

Date: April 18, 2006
Time: 2:00 p.m. - 3:30 p.m.
Place: NASA Ames Conference Center (Building 3) Ballroom

Registration is required. Please register on the Web at http://environment.arc.nasa.gov/pub_events.php

Seventh Generation Inc. is a leading brand of non-toxic and environmentally friendly household cleaning and personal care products. Hollender has risen to success by building a company based on the concept of corporate responsibility. Like NASA, Seventh Generation has a mission, budget constraints and stakeholders to please. Yet Hollender has shaped his business to fit with the evolving consensus that a new standard is needed to measure and reward business performance. Hollender's talk will explore the fundamental change that is occurring in our corporate culture that is making responsible business behavior an imperative rather than something a handful of 'nice' businesses choose to do. He will discuss how there is growing evidence that responsibility, transparency and accountability are becoming the new cultural and business norm. If done successfully, the process introducing corporate responsibility into a business brings disparate groups of investors and customers into a unique form of synchronization. The result is a corporate community of stakeholders that creates truly long-term value not just for shareholders, but also for all.

Celebrate Earth Day 2006 with AIB Express and Environmental Services Division

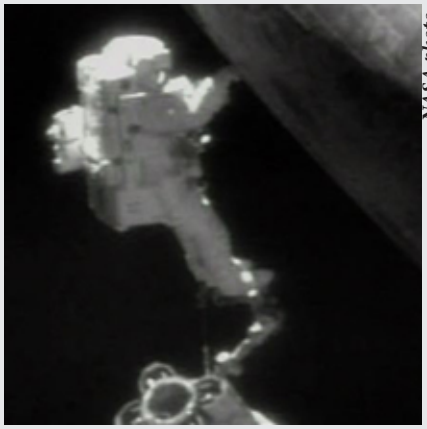
The AIB Express will host its semi-annual free customer appreciation lunch.

Date: April 20
Time: 11:00 a.m. to 1:00 p.m.
Place: Building 255

In celebration of Earth Day, which is April 22 of each year, the Environmental Services Division will host its annual environmental event in conjunction with the AIB lunch.

'Green,' or environmentally-friendly, companies will be on hand to share information describing ways in which you can make more sustainable choices every day at home and at work.

Steve Robinson to visit Ames



NASA photo

NASA Astronaut Steve Robinson will be at Ames on April 12 to mark the celebration of the 25th Anniversary of STS-1, the first orbital flight of the space shuttle. He will make a presentation to the Ames employees in the afternoon and give an evening talk to the general public. Check Ames centerwide announcements for more details.

Robinson, a former Ames employee, flew on STS-114 Discovery (July 26-Aug. 9, 2005), the 'Return to Flight' mission. In the above photo, he is seen grabbing a piece of gap filler from between tiles on the shuttle orbiter during a space walk on Aug. 3. An inspection revealed that two pieces of fabric that plugs gaps between shuttle tiles were protruding about an inch. NASA decided to try to remove them after an analysis showed they could threaten the craft's safe return to Earth. The operation marked the first time NASA has tried to repair the shuttle's exterior in orbit.

The Silicon Valley Astronomy Lecture Series presents:

Topic: News from the Distant Past: How Galaxies Tell Their Stories
Speaker: Astronomer Ron Marzke of San Francisco State University will give this non-technical, illustrated talk
Date: Wednesday, April 26, 2006
Time: 7 p.m.
Place: Smithwick Theater Foothill College El Monte Road and Freeway 280, in Los Altos Hills

Cost: Free and open to the public. Parking on campus costs $2.

Call the series hot-line at (650)949-7888 for more information and driving directions.

March Environmental Forum set

Topic: Recycling at Ames and Beyond
Date: April 6, 2006
Time: 9:00 a.m.- 10:00 a.m.
Place: Building 218 training room (2nd floor)
Hosted by: Ames Environmental Services Division and Ames Logistics

NASA Software of the Year - call for nominations

This is the official call for nominations for the 13th annual NASA Software of the Year Award. This prestigious award is designed to give recognition to developers of exceptional software created for or by NASA (must be owned by NASA). Every NASA center and facility is invited to participate in this competition. The award includes the NASA Software Medal, a certificate signed by the NASA administrator and up to $100,000.

The NASA Inventions and Contributions Board Web site is located at: http://icb.nasa.gov. It contains information about the last 12 competitions, the required forms (NF1329 and the Summary Evaluation Document), criteria and other general information about the award. Contact NASA Ames Space Act Award liaison officer Elizabeth (Betsy) Robinson at e-mail Elizabeth.T.Robinson@nasa.gov or ext. 4-3360 to discuss possible candidates.

Excellence in software is vital to the agency's leadership role in developing aeronautics and space technologies and transferring them to government and industry. The NASA Software of the Year Award competition allows us to recognize and appreciate the NASA team members that set high standards for significant software that is creative, usable, transferable and possesses inherent quality.

This year the award is sponsored by NASA's chief engineer, chief safety and mission assurance officer and chief information officer.

Nominations are to be submitted electronically to Elizabeth Robinson in the Ames Technology Partnerships Division by COB April 14, 2006.

NASA Ames won this award in 2002 with 'Cart3D: A Package for Automated Cartesian Grid Generation and Aerodynamic Database Creation.' Other Ames winners include Remote Agent (1999), Center TRACON Automation System (1998), Flow Analysis Software Toolkit (1995) and Incompressible Navier-Stokes Flow Solver in Three Dimensions (INS3D) (1994).

BY LISA WILLIAMS

On line SATERN system to replace AdminSTAR and SOLAR

The System for Administration, Training and Educational Resources for NASA (SATERN) is a new, federally mandated system that will replace NASA's current learning systems: AdminSTAR and SOLAR.

Employees and supervisors will be able to take advantage of existing online NASA courses moving over from SOLAR such as IT security training and safety training. SATERN also will provide all NASA staff with access to Web-based course registration for center and agency courses offered during the year.

The new SATERN Web site will enable employees to view Ames and NASA course catalogs directly from their desktops. Employees will enroll in courses, schedule training and view their training history on the Web. In addition, employees can launch online Web-based courses and access commercially available e-learning courses through SATERN, if purchased by NASA.

Please take note of the important dates provided for you below:

May 8 - Scheduled 'Go-Live'
Late April through June
- Training for supervisors and learners
April 26 - SOLAR shuts down permanently

Considering the SOLAR shut down date, all mandatory bankcard and IT security training should be completed before April 25 to ensure employees have recorded completion of the training.

For more information, contact Susan Kalb at ext. 4-5624 or Barbara Chenier at ext. 4-6986 or visit the Web at http://ameshr.arc.nasa.gov/SATERN/index.html

BY BARBARA A. CHENIER

NAAS to help initiate, track employee awards

As part of the 'e-Gov' initiative, NASA will be automating the processing of awards across the agency. The

new NASA Automated Awards System (NAAS) will allow supervisors to initiate and track cash and time-off awards for their employees. In addition, the NAAS will provide supervisors reporting capabilities and real-time data on employee award histories via the Web site. 'Go-Live' is currently scheduled for June 2006.

For more information, contact project lead Christiana Woodward at ext. 4-1599 or deputy project lead Lynette Forsman at ext. 4-5267. The functional sponsor is Gail James, the incentive awards program manager.

Updates on supervisory and employee training information will be provided for both SATERN and NAAS via Astrogram articles, human resources and training Web sites and centerwide announcements.

BY BARBARA A. CHENIER

Ames mail services center has moved

In March, the Ames mail room moved to a new location (Bldg. N255B), located next to the AIB store. Customers should enter on the north side of Bldg. N255 to gain access to the new mail room building.

Parking is available along the right side of Bldg N255B. Due to a large number of delivery trucks, please take precautions when entering or leaving the gate.

The mail room hours are Monday through Friday from 7:30 a.m. to 11:30 a.m. and from 12:30 p.m. to 3:30 p.m.

All service requirements/time frames will remain the same.

If you have any questions about large volume mailings, overnight delivery, certified mailings, etc., please contact the mail room at ext. 4-5994.

NASA photo by Steve Perry

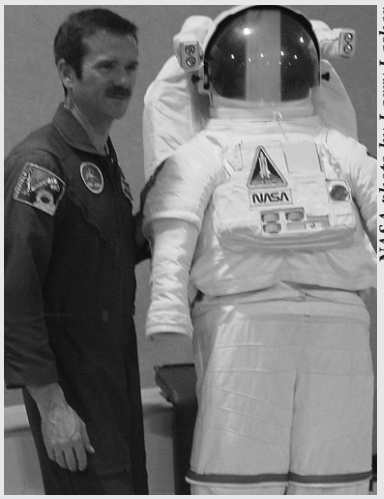
The Ames Mail Room, now located in Bldg. 255B next to the AIB Store.

Ames bids adieu to Hubbard

NASA photo by Dominic Hart

The Ames family bid farewell to former Ames Center Director G. Scott Hubbard on Feb. 24 in the NASA Ames Conference Center. Hubbard's years and leadership at Ames were celebrated during the event. The Ames Jazz Band played, as did Hubbard himself playing a guitar. Hubbard announced in February of this year that he had accepted a new position as the Carl Sagan Chair for the Study of Life in the Universe at the SETI Institute.

Astronaut speaks at local event



NASA photo by Larry Lasher

The Ames outreach program supported a visit by astronaut Colonel Chris Hadfield to the Menlo Park School space event on March 2. NASA Ames provided a space suit, moon rock, shuttle model and other items for the event. Hadfield shared his experiences of walking in space, flying on the space shuttle and working with a robotic arm to fix the space station. The event drew an audience of over 400 students, parents and the surrounding community.

Enjoy the fun of bicycling - join Ames' Bicycle Commute Team(s)

Remember the fun you had as a kid when you rode your bicycle? Capture that feeling again with the Ames Bicycling Club. The club is forming team(s) to participate in the National Bike Commute Month Team Bike Challenge. This contest, sponsored by http://511.org/ (follow the links under bicycling, bike to work day, team challenge), encourages existing bicycle commuters to share their joy in bicycling by recruiting their colleagues, friends, neighbors and local honorary figures to bicycle to work, school, errands, or play during the month of May, which is National Bike Commute Month.

Participants in the Team Bike Challenge will form teams consisting of five individuals. Each team must include at least two new or leisure cyclists and as many experienced bike commuters as it takes to complete the team. Additionally, the team can accumulate additional bonuses if it contains one honorary member (elected official, CEO, journalist, etc).

The team(s) will register (registration is underway) so they can track their trips made by bike as they compete against other teams during the entire month of May. New or leisure cyclists on a team get double points while honorary team members get triple points for every trip taken by bike! At the end of the challenge the team with the most points will win a grand prize!

Interested individuals are encouraged to contact Ted Roush at ext. 4-3526 or e-mail troush@mail.arc.nasa.gov or Julie Nottage ext. 4-3711 or e-mail jnottage@mail.arc.nasa.gov.

BY TED ROUSH

In Memory of...

Edward C. Hook was a great friend, co-worker and senior software engineer. He passed away on Feb. 21, 2006. He was 60 years old.

Hook worked in the NASA Advanced Supercomputing (NAS) Division at Ames for the past 15 years and made many significant contributions including the maintenance and support of the portable batch system, used to schedule and run jobs on NASA's fastest supercomputer, Columbia. Hook was also extremely dedicated to assisting supercomputing users and it was not uncommon to find him covering the phones over the weekends answering their questions.

Hook received a bachelor's degree in mathematics from Georgetown University in 1966 and earned his PhD from the University of Virginia in 1970 (also in mathematics). In addition to receiving numerous computer support awards throughout his career, Hook delivered presentations at computer conferences, developed and presented training classes and taught at the Massachusetts Institute of Technology and Fordham University. He also contributed to the Control Data Corporation at Von Neumann Supercomputing Center at Princeton University.

Known for his quirky sense of humor, kindness and wittiness, Hook will be sorely missed in the halls of NAS. He is survived by wife Margaret Hook and his two daughters Karen and Elizabeth.

Edward C. Hook

BY HOLLY A. AMUNDSON

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

Ames Bicycling Club Every 3rd Wednesday of the month 11:00 a.m. to12:00 p.m. in Building 245 auditorium. POC: Julie Nottage at jnottage@mail.arc.nasa.gov or ext. 4-3711. By-laws of Ames Bicycling Club can be found at: http://zen.arc.nasa.gov, the link is under the picture.

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://accc.arc.nasa.gov), 12 noon to 1:30 p.m., N-210, Rm. 205. POC: Cheryl Quinn, ext 4-5793.

Ames Contractor Council Mtg, first Wednesday each month, 11 a.m., N-200, Comm. Rm. POC: Linda McCahon, ext. 4-1891.

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.

Ames Federal Employees Union (AFEU) Mtg, third Wednesday of ea. month, 12 p.m. to 1 p.m., Bldg. 221, Rm 104. Guests welcome. Info at: http://www.afeu.org. POC: Marianne Mosher, 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: 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, second Thursday of ea. month (Feb through Nov), from 12:00 p.m. -1:00 p.m. in Bldg. N-262, Rm 100. URL: http://sail.arc.nasa.gov/. POC: Becky Hooey, ext. 4-2399.

Environmental 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: Stacy St. Louis 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: Bob Hilton at ext. 4-2909, bhilton@mail.arc.nasa.gov.

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.

Ames' STS-1 contributions: greatest test flight in history

continued from page 8

control system problem. On this first flight, as the oscillation began to diverge dangerously close to the ground, Haise had enough confidence and simulator training to simply let go of the controls and allow the oscillation to damp itself out.

Following that, a major investigation was conducted in the FSAA to re-evaluate the control systems gains, in order to minimize the possibility of future PIO problems. In addition, work was conducted for several years in the simulator to investigate the terminal area energy management concepts designed by engineers at JSC.

Development support for the space shuttle, prior to the first flight, also included approach/landing control system and handling qualities, heads-up display concept, speed brake scheduling, astronaut training, flight techniques for failure recovery, and landings of the shuttle from atop the 747 carrier aircraft.

Vertical Motion Simulator

In 1980, Ames' new Vertical Motion Simulator (VMS) began operation. It wasn't long before the VMS earned a reputation as the best simulator anywhere for the continuation of engineering design and shuttle pilot training. Landing systems and flight rules are done on the VMS with astronaut crews and JSC engineers. Ames' SimLab and VMS have supported the shuttle program on a continuing and scheduled basis ever since.

Conclusion

On April 14, 1981, commander John Young and pilot Robert Crippen brought space shuttle Columbia to a safe landing at Dryden Flight Research Center. STS-1's mission duration of 2 days, 6 hours, 20 minutes and 53 seconds included 37 orbits of the Earth.

This first, brief mission proved the capability of the world's first and only reusable space vehicle. It successfully tested the Space Transportation System's major systems and demonstrated the safe launch into orbit and safe return of the orbiter and crew. It also verified the combined performance of the entire shuttle vehicle - orbiter, solid rocket boosters and external tank.

Ames played a critical role in making the space shuttle 'happen,' especially in the areas of aero/aerothermodynamics, thermal protection systems and piloted flight simulation areas. It is one element of the center's heritage that should be a source of pride to everyone at Ames.

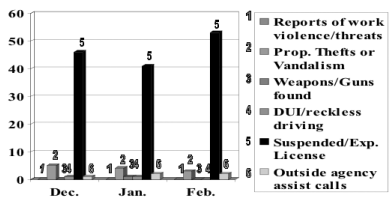
As it has nearly 40 years, the talented professionals at Ames are continuing to provide essential skills and facilities to support the human space program. Current projects and tasks consist of work on the crew exploration vehicle (CEV) thermal protection system, CEV aerosciences analysis, CEV integrated system health management, crew cabin and cockpit display development, CEV guidance, navigation and control software verification and validation, crew launch vehicle (CLV) simulation assisted risk analysis, and CLV integrated system health management.

By Jim Arnold and Ann Sullivan, with contributions from Howard Goldstein, Tom Alderete and Jack Boyd

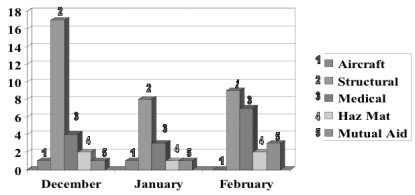
Protective Services monthly activity

A statistical summary of activities of the Protective Services Division's Security/Law Enforcement and Fire Protection Services units for the month of Feb. 2006 is shown below.

Security/Law Enforcement Activity



Fire Protection Activity



Ames Classifieds

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

Housing

Room available for rent in house in mid town Palo Alto, with kitchen, laundry, and pool, $500 plus $50 toward utils, for a quiet, neat, stable and conscientious person or couple. E-mail jims@eos.arc.nasa.gov; ham call wb6yoy.

Looking for a roommate, female prof'l preferred, to share a 2bd/2ba new condo in Mtn. View downtown begin May 1. Spacious (~1400 sq ft). New kitchen appliance, W/D inside. Garage parking. One block from Castro, close to MV library, Cal train station. Very spacious bedroom (at least 10x20 ft), two bay windows. $1,200/mo. E-mail jingmei007@yahoo.com

Miscellaneous

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

Baby blue woman's O'Neil surf shorts, 100% polyester size 8, near perfect condition. $10.00. Call (408) 234-0025.

Automotive

'92 Harley Davidson Softail Custom - $8,500 or B/O. Call Barry Cunningham (510) 793-4457, e-mail: EZrdrdad@comcast.net

Safety Data

NASA-Ames Occupational Illness-Injury Data for Calendar Year-to-Date 2006
Feb. 1, 2006 - Feb. 28, 2006

	Civil Servants	Contractors
First aid cases	3	2
Lost-time cases	0	0
Recordable cases	0	1
Lost workdays	0	0
Restricted duty days	0	0

Above data is as of 2/28/06. May be subject to slight adjustment in the event of a new case or new information regarding an existing case.

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.

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-943 (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.

Ames Swim Center (N-109) 603-8025

Ames Swim Center, 25 meter swimming pool open and heated year round. (80-82 degrees) Lap swim: Mon, Weds, Fri, 10 a.m. to 1 p.m. and 3-6 Tues to Thurs 10 a.m. to 1 p.m. and 4 p.m. to 7 p.m. Seasonal recreation swim; swim lessons. Locker rooms w/sauna and shower facility. Open to all civil servants and contractors. Location: Bldg. 109 across the street from the tennis courts. Fees vary depending on activity. POC: Tana Windhorst, ext. 3-8025; e-mail: tw4lsb@aol.com

Vacation Opportunities

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

South Lake Tahoe cottage w/wood fireplace, hot tub. Rates $50 to $130 per night. Call (650) 967-7659.

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

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

Tahoe Donner vacation home, 2 bd/2ba. trees, deck. 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.

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

Disneyland area vacation rental home, 2 bd/1ba. Nearing completion completely remodeled w/new furniture. Sleeps 6 (queen bed, bunk beds, sleeper sofa). Air hockey and football tables. Introductory rate $600/wk, once completed rate will be $1000/wk. Security deposit and $100 cleaning fee required. Call (925) 846-2781.

New York, 5th Ave. One fully furnished bedroom in 24 hour security bldg. overlooking Washington Square Park, $1,000/wk or $3,000/mo. negotiable. Call (650) 349-0238.

Paris/France: Fully furnished studio, 5th Arr, Latin Quarter, Notre Dame and Lie-St. Louis., $1,400/wk. negotiable. Call (650) 349-0238.

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

West Maui vacation at Kahana Falls, across street from beach. Thanksgiving week 19-26 Nov 05, $630/wk. 1bd/2 ba, w/d, fk. For 2 adults, 0 to 2 kids. Call (650) 962-1314 after Aug 7.

Vacation rental. Ferndale - The Victorian Village. Victorian home on Main Street a short stroll to the Village which has been designated as a state historical landmark. Enjoy the many holiday activities which include a Christmas parade and lighting of America's tallest living Christmas tree. Four bedrooms (sleeps approx. six), two full baths, large kitchen, dining room, parlor w/fireplace, enclosed desk w/hot tub. For info call (707) 983-9514.

Monterey Bay vacation rental at Pajaro Dunes, 20 miles south of Santa Cruz, 3bd/2ba beach house with distinctive architecture. Beautiful ocean and valley views, only 150 ft from the beach, first-class tennis courts. $500/wkend, $200/addl night, including cleaning by the maid service when you depart. Call (408) 252-7260.

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

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

Astrogram deadlines

Please submit articles, calendar and classified advertisements to astrogram@mail.arc.nasa.gov no later than the 10th of each month. If this falls on the weekend or holiday, then the following business day becomes the deadline.

For Astrogram questions, contact Astrid Terlep at the aforementioned e-mail address or ext. 4-3347.

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.

Katrina and a 1906-magnitude earthquake *-- comparisons and preparations*

continued from page 4

five days. Similarly, Ames cannot depend on external support for at least five days after a catastrophic earthquake. Even then, support will have to come from the federal government (FEMA), not from local or state agencies. Even when federal support is mobilized, it will take two to three days for rescue teams to arrive, and three to six days for commodity distribution and sheltering. Supplies will not be readily available, as FEMA will immediately purchase all available supplies.

If a major earthquake strikes during business hours, the center will do its best to care for its on-site employees, as well as providing available information about traffic conditions, damage, relief efforts, and other pertinent issues. The federal government is obligated to support the community, and support to federal agencies is not a priority, Dolci explained.

The most important thing we as individuals can do is to prepare an emergency plan and emergency kit for ourselves and our families, Dolci stressed. His suggestions:

- Have five days of food and water, prescription medications, etc., at home.
- Have several days of clothing at Ames (and water and food).
- Store water and extra clothing in your car.
- Purchase or make the best emergency kit you can afford.
- Consider a portable generator.
- Don't forget to plan and provide for your pets, as they are not allowed in emergency shelters.
- Learn advanced first aid and CPR (free classes are offered at Ames).
- Keep at least a two-week supply of your prescription medications on hand
- Have a three-to-five day supply of medication at work or in your car.
- If your community has a citizen emergency response team, join it!
- Store some supplies remotely, in case your home is destroyed and inaccessible.
- Have a plan for temporary shelter and sanitation issues.
- Have a supply of cash available, as ATMs won't work without electricity and banks may be closed or damaged.

Ultimately, how well we fare in the aftermath of a catastrophic earthquake or other major disaster depends on how well we prepare. For more information about earthquake preparedness, go to https://disasterhelp.gov/portal/jhtml/index.jhtml

BY ANN SULLIVAN

Education Associates host poster session

NASA photo by Tom Trower

The Education Associates Program held a poster presentation in the Ames Mega Bites café in March. The poster presentation included work from education associates at varied academic levels from undergraduates thorough post-docs in Codes A through Y. The program offers college and university students and faculty the opportunity to experience science and technology in the unique environment of NASA.

Astrogram

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Editor-in-Chief..... Laura Lewis
Managing Editor.....Ann Sullivan
Editor, Layout and Design.....Astrid Terlep

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