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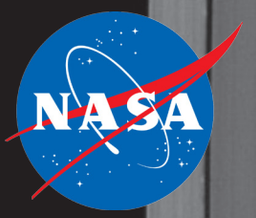

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This Month in Goddard History

By Rob Garner

"This Month in Goddard History" is a series celebrating the Center's history through stories and photos from the archives of the Goddard News. ■

1993 fall community day fair attracts over 1,000 visitors

Photo by Pete Baltzell

Visitor Center Volunteer Mark Erganian helps several guests try on an astronaut's suit.

Goddard's Community Day on September 19 offered a multitude of activities for visitors of all ages. Special events included a presentation, to a standing-room only crowd, by Astronaut Ronald A. Parise on "The Flight of Astro-1," spacesuit demonstrations by Visitor Center Volunteer Mark Erganian, musical entertainment by the MAD Jazz Band and model rocket launches which delighted hundreds of onlookers. The Engineering Fair, showcasing the work of Goddard's world renown engineers was the highlight of the day for many visitors. The fair exhibits included robotics, fiber optics, thermal systems, solar cars and instruments from space shuttle missions.

Photo credit: Pete Baltzell

Caption: While not on the scale on last year's LaunchFest, Goddard's Community Day was a hit with those that attended. This photo shows a Visitor Center volunteer mobbed by young space fans (from the October 1993 issue of "Goddard News").

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Cover caption: Ring material pulled to new heights above the ring plane by the gravity of the moon Daphnis casts long shadows on Saturn's A ring in this *Cassini* image taken about a month before the planet's August 2009 equinox. Daphnis is a bright dot in the Keeler Gap of the A ring on the right of the image. The thin F ring on the left of the image shows the perturbations caused by the moon Prometheus.
Photo credit: NASA/Space Science Institute

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Managing Editor: Trusilla Steele
Editor: John Putman

Deadlines: News items for publication in the Goddard View must be received by noon of the 2nd and 4th Friday of the month. You may submit contributions to the editor via e-mail at john.m.putman@nasa.gov. Ideas for new stories are welcome but will be published as space allows. All submissions are subject to editing.

Goddard and the World Watch the *Lunar Crater Observation and Sensing Satellite* Impact the Moon's Surface

By Grey Hautaluoma and Ashley Edwards

NASA's *Lunar Crater Observation and Sensing Satellite*, or LCROSS, created twin impacts on the Moon's surface on October 9, 2009 in a search for water ice. Scientists will analyze data from the spacecraft's instruments to assess whether water ice is present.

The satellite traveled 5.6 million miles during an historic 113-day mission that ended in the Cabeus crater, a permanently shadowed region near the Moon's south pole. The spacecraft was launched June 18 as a companion mission to the Goddard-produced *Lunar Reconnaissance Orbiter* (LRO) from NASA's Kennedy Space Center in Florida.

"The LCROSS science instruments worked exceedingly well and returned a wealth of data that will greatly improve our understanding of our closest celestial neighbor," said Anthony Colaprete, LCROSS Principal Investigator and Project Scientist at NASA's Ames Research Center in Moffett Field, Calif. "The team is excited to dive into data."

Moving at a speed of more than 1.5 miles per second, the *Centaur* hit the lunar surface shortly after 7:31 a.m., creating an impact that instruments aboard LCROSS observed for approximately four minutes. LCROSS then impacted the surface at approximately 7:36 a.m.

Goddard employees jammed into the Building 3 Auditorium to watch the impact. LCROSS imaged the impact and provided direct measurements of the plume before it also plunged into the lunar surface.

Photo credit: Debora McCallum

Caption: Goddard employees applaud the successful impact of LCROSS on the Moon's surface.

Dr. John Keller, LRO Deputy Project Scientist, was on hand to give a quick overview of the LCROSS mission and the impacts themselves.

Later in the morning, the Goddard Visitor Center hosted home school families from Virginia and Maryland beginning post-impact at 9:00 a.m.

Photo credit: Debora McCallum

Caption: Kids enjoy Moon-based activities at the Visitor Center.

"This is a great day for science and exploration," said Doug Cooke, Associate Administrator for the Exploration Systems Mission Directorate at NASA Headquarters in Washington. "The LCROSS data should prove to be an impressive addition to the tremendous leaps in knowledge about the Moon that have been achieved in recent weeks."

Other observatories reported capturing both impacts. The data will be shared with the LCROSS science team for analysis. The LCROSS team expects it to take several weeks of analysis before it can make a definitive assessment of the presence or absence of water ice.

"I am very proud of the success of this LCROSS mission team," said Daniel Andrews, LCROSS Project Manager at Ames. "Whenever this team would hit a roadblock, it conceived a clever work-around allowing us to push forward with a successful mission."

The images and video collected by the amateur astronomer community and the public also will be used to enhance our knowledge about the Moon. "One of the early goals of the mission was to get as many people to look at the LCROSS impacts in as many ways possible, and we succeeded," said Jennifer Heldmann, Ames' Coordinator of the LCROSS observation campaign. "The amount of corroborated information that can be pulled out of this one event is fascinating."

"It has been an incredible journey since LCROSS was selected in April 2006," said Andrews. "The LCROSS Project faced a very ambitious schedule and an uncommonly small budget for a mission of this size. LCROSS could be a model for how small robotic missions are executed. This is truly big science on a small budget."

For more information about the LCROSS mission, including images and video, visit: http://www.nasa.gov/lcross. ■

NASA Sponsors Women in Astronomy and Space Science 2009 Conference

By Cynthia O'Carroll

Space science research institutions have traditionally been populated by a strong male workforce, but this structure is rapidly changing. Today's workforce is much more diverse with individuals from various cultures and backgrounds, a higher percentage of women, and in many cases, up to six generations in the same workplace.

Both management and employees are in need of tools to help them understand where they are headed and how to get there successfully together. To help meet these challenges, the "Women in Astronomy and Space Science 2009: Meeting the Challenges of an Increasingly Diverse Workforce" conference was held on Oct. 21-23, 2009, at the Inn and Conference Center, University of Maryland University College, Adelphi, Md.

"NASA has a high concentration of dedicated scientists," stated Anne Kinney, Director of the Solar System Exploration Division at NASA's Goddard Space Flight Center. "The goal of this conference is to foster diversity and help build a stronger workforce in science, engineering, and technology that will open doors for everyone."

Photo credit: Jay Freidlander

Caption: From left to right: Anne Kinney, Goddard; Vera Rubin, Department of Terrestrial Magnetism, Carnegie Institute of Washington; Nancy Grace Roman, Goddard (Retired); Kerri Cahoy, Ames Research Center, Moffett Field, Calif.; Randi Ludwig. University of Texas, Austin, Texas.

This three-day conference highlighted the diversity of today's scientific professions by establishing the statistics of the current workforce and defining the roles of institutions and professional societies in preparing future scientists to succeed in their chosen fields. Discussions provided strategies for fostering a successful work environment, allowing both managers and employees to explore pertinent topics including management best practices, early career needs, work/life balance, and managing future expectations.

Professional societies, institutions, and organized groups have always played an important part in improving the status of women and minorities in the scientific workforce. Topics presented included best practices for recruiting, promoting, mentoring, and retaining women and minorities. Speakers shared their personal route to careers in areas such as international development, science management, non-profit organizations, and aerospace administration, and answer questions.

Opening day remarks were delivered by Anne Kinney, Director of the Solar Exploration Division at Goddard. The keynote welcome came from Ed Weiler, NASA Associate Administrator, Science Mission Directorate, NASA Headquarters, in Washington, D.C.

The keynote address was presented on the final day of the conference by Congresswoman Donna Edwards. A panel discussion, "What It Takes to Become a Principal Investigator, Project Scientist, or Instrument Scientist," was chaired by Nobel laureate and NASA Senior Astrophysicist John Mather of Goddard.

A tour of the White House capped off this exciting conference with a discussion with Tina Tchen, Director of the White House Office of Public Engagement and Executive Director of the White House Council on Women and Girls. The discussion focused on women in science, engineering, technology, and math and where they are headed in future.

In conjunction with the Women in Astronomy (WIA) and Space Science 2009 Conference, a professional skills development workshop was held on Tuesday, October 20. The participants learned negotiation skills through interactive means including case studies, personal assessments, and role playing.

For more information about WIA 2009, visit: http://wia2009.gsfc.nasa.gov. ■

Photo credit: Jay Freidlander

Caption: Attendees at the Women in Astronomy and Space Science 2009 conference.

NOVA Special Takes Viewers Behind the Scenes of *Hubble* Servicing Mission

By Susan Hendrix

After more than three years in the making, the much anticipated documentary "Hubble's Amazing Rescue" debuted October 13 on Public Broadcasting Service (PBS) stations across the country.

According to executive producer, writer, and director, Rush DeNooyer, the documentary takes viewers behind the scenes and offers an in-depth look at the painstaking preparations that ultimately resulted in a picture perfect repair mission to the *Hubble Space Telescope* in May 2009.

The program documents some of the trials and tribulations that NASA engineers from Goddard Space Flight Center and Johnson Space Center and the astronauts faced during preparations for the fifth and final Shuttle mission to *Hubble.*

DeNooyer followed a dedicated engineering team based at Goddard that helped choreograph all five spacewalks for the mission. The Goddard engineers trained side-by-side with the *Hubble* astronauts in the Center's large cleanroom and made countless trips to Johnson to assist the STS-125 crew with their underwater training sessions in the Neutral Buoyancy Lab's 6 million gallon pool at Johnson. The program also includes some of the more gut wrenching moments faced by the astronauts during the mission.

Photo provided by Rush DeNooyer

Caption: NOVA producer (third from right) poses with HST engineers (from left) Steve Leete, Mark Jarosz, Matt Ashmore, Justin Cassidy, Kevin Mathews, and Ed Rezac during a break from filming at Goddard.

This NOVA special is the result of a unique collaboration between NOVA and Goddard. DeNooyer recognized early on that he may encounter challenges gaining unfettered access to NASA facilities. DeNooyer approached Goddard management and Goddard's Office of Public Affairs and asked if he could illicit help from one of the Center's top producers, Mike McClare.

Working in tandem, DeNooyer and McClare embedded themselves in the mission preparation process. Together they documented closed door training sessions and progress meetings at Goddard and at Johnson that give viewers a rare glimpse into the ups and downs of mission prep.

Photo provided by Rush DeNooyer

Caption: Former NASA Administrator Mike Griffin during his interview with producer Rush DeNooyer for NOVA's Hubble *special.*

"Our relationship worked really well on so many levels," said McClare. "Servicing Mission 4 was a big, rich, dynamic story; really too big for a one-hour program. Rush and I pursued many different storylines never knowing until the end how the mission and story would evolve. This meant a lot of shooting and an eye for the right cinematic approach to help viewers understand what it takes to pull off a Hubble servicing mission.

"About 75 percent of the footage I shot with Rush over a three-year period leading up to the launch of Atlantis could be featured in the PBS NOVA special," said McClare. "We were relentless in our quest for the right footage." "I would have never reached my program goals without Mike's assistance," said DeNooyer. "Together with NASA Public Affairs, I was able to document the *Hubble* story from a very unique point of view."

Three years, one breathtaking Shuttle launch, and five tedious space walks have brought *Hubble* to the apex of its capabilities. Several breathtaking new science images were released in September 2009 and are absolute proof that *Hubble* is better than ever and ready to unlock more secrets of the universe.

NOVA is a documentary series produced by WGBH in Boston. NOVA is the highest rated science series on television and the most watched documentary series on public television.

To watch the special, go to: http://www.pbs.org/wgbh/nova/hubble. To find out when the show will air again in your area, visit: http://www.pbs.org/wgbh/nova/schedule.html. ■

FASTSAT Instruments Shipped to NASA Marshall for Tests and Launch Preparation

By Rob Gutro

Three of the satellite instruments that will fly on an upcoming satellite mission called FASTSAT have been created at one NASA Center and have arrived at another for more tests to ensure they are flight ready for launch. They are now at the Marshall Space Flight Center in Huntsville, Ala. for further testing. FASTSAT is an acronym for *Fast, Affordable Science and Technology Satellite*. The development, integration, test, and operations of the three instruments is a collaborative effort between Goddard Space Flight Center, NASA's Marshall Space Flight Center in Huntsville, Ala., and the U.S. Naval Academy (USNA) in Annapolis, Md.

FASTSAT will be flying a total of six instruments approved by the U.S. Department of Defense (DoD) Science and Experiments Review Board. It is a multi-spacecraft/payload mission named STP-S26, which is executed by the DoD Space Test Program (STP) at the Space Development and Test Wing (SDTW) at Kirtland Air Force Base, N.M. The mission will launch four satellites and three cubesats into low Earth orbit.

The three instruments that will fly on FASTSAT were built at Goddard and have already gone through some tests. The instruments include the Thermosphere Temperature Imager (TTI) that will make measurements for things like spacecraft drag; the Miniature Imager for Neutral Ionospheric Atoms and Magnetospheric Electrons (MINI-ME), a low energy neutral atom imager that will detect neutral atoms formed in the plasma population of Earth's outer atmosphere; and the Plasma and Impedence Spectrum Analyzer (PISA), which will test a new measurement technique for the thermal electron populations in the ionosphere and their density structuring, which can interfere with or scatter radio signals used for communication and navigation.

The instruments are part of long-standing partnership between Goddard and the USNA. Naval Academy Midshipmen have assisted with development and systems integration of instruments, and will be involved in the payload commanding and data analysis.

Past activities involved instrument spacecraft integration including vibration testing and analysis of instrument data. These activities complement the USNA's engineering and science curriculum. "This continues educational outreach activities between Goddard and the Academy spanning 15 years and builds on NASA experience with the Academy's MidSTAR-1 satellite in which several NASA experiments successfully flew," said Commander David Myre of the Aerospace Engineering Department at the USNA.

The TTI will provide the first global-scale measurements of thermospheric temperature profiles in the 200–400 km (124–248 miles) region. The temperature profile sets the scale height of the thermosphere, which determines the density at orbital altitudes and therefore the aerodynamic drag experienced by military spacecraft.

"The MINI-ME instrument is a low energy neutral atom imager. Low energy neutral atom imaging is a technique first pioneered at Goddard that allows

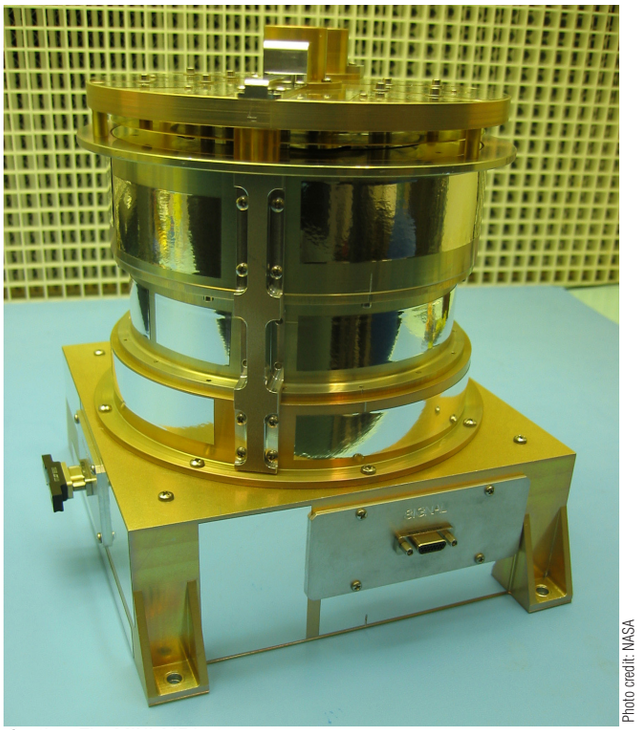

Photo credit: NASA

Caption: The MINI-ME instrument.

scientists to observe remotely various trapped charged particle populations around Earth that we would normally only be able to observe in-situ—or exactly where an instrument is," said Michael Collier, Principal Investigator at Goddard. "It's an improvement on the same kind of instrument, LENA (Low Energy Neutral Atom), that flew on the IMAGE (*Imager for Magentopause-to-Aurora Global Exploration*) mission. Measurements made by instruments like MINI-ME will enable more accurate prediction of space weather."

PISA is the third instrument on FASTSAT. Principal Investigator Doug Rowland at Goddard said, "PISA will determine when and where the ionosphere becomes structured or turbulent, permitting better predictive models of space weather effects on GPS signals."

Collier said, "Although the three instruments are stand-alone experiments, the FASTSAT project currently plans at times to operate all three instruments simultaneously in flight. This will allow the Goddard investigators to use the information from the other instruments to better understand their own data."

"The instruments are a collaborative effort between the Naval Academy and Goddard, allowing midshipmen to work side-by-side with scientists and engineers providing them unique experiences and training for the future Navy Space Cadre," Commander Myre said.

The satellite was created at NASA Marshall with the Von Braun Center for Science and Innovation, in partnership with Dynetics, a corporate partner. "Engineers at NASA Marshall will test TTI, Mini-ME, and PISA to ensure they can withstand the vibrations of launch, and the frigid temperatures in space," said FASTSAT Project Manager Mark Boudreaux at NASA Marshall. ■

The Compassion of Individuals—The Power of Community

By Nita Jilek

This year's Combined Federal Campaign (CFC) kick-off event was held on September 14 in the Building 8 Auditorium. The kickoff speakers were Goddard Combined Federal Campaign (CFC) Manager, Mary McKaig, Goddard Campaign Chair, Nancy Abell, and Goddard employee, Chris Durachka, who reflected on how CFC has touched his life. Kids from Goddard's Child Development Center performed two songs.

Broad civil servant employee participation is key to a successful campaign and integral to the Goddard campaign theme for this year: "The Compassion of Individuals—The Power of Community." CFC contributions are voluntary (and tax deductible) and may be easily pledged a myriad of ways. Effective this year, from September 29 through December 15, civil servant employees can give via Employee Express (EEX) rather than WebTADS as in the past. The CFC module within EEX is user-friendly and includes greater search capabilities. For instructions on accessing the CFC module in EEX, searching for and selecting desired charities, and selecting your donation amount, please visit the NASA Shared Services Center (NSSC) Notices Web page at: https://www.nssc.nasa.gov/notices. For assistance with EEX, contact the Employee Express Help Desk via e-mail at EEXHelp@opm.gov or call 888-353-9450 toll-free.

Alternatively, you may review the frequently asked questions by visiting https://www.employeeexpress.gov and clicking on the FAQ link at the top of the page. Additionally, the keyworkers in your organization have received training on electronic donation using EEX and will be available to answer any questions you may have. This is by far the easiest method of giving available to Goddard employees.

Donations can also be submitted through paper pledge cards. Volunteer CFC keyworkers throughout the Goddard community will distribute these pledge cards to all employees. CFC material is also available online at http://www.cfcnca.org—the official Web site for Federal employees working in the National Capital Area. The Web site features an easy e-Giving online option that allows you to electronically search for the charity of your choice by subject or keyword, as well as the 2009 Catalog of Caring, which provides information on over 4,000 participating charities.

The CFC, established during President John F. Kennedy's administration, is the world's largest workplace charity drive. As part of the CFC's National Capital Area, Goddard employees have a long tradition of contributing to thousands of charities through the annual campaign. Despite the economic downturn, Federal employees in the Washington, D.C. area stepped up and pledged more than $62.7 million to people in need through the Combined Federal Campaign of the National Capital Area (CFCNCA) in 2008, making it the largest campaign in the history of the CFC program. The total contributions represent a $1.9 million increase, up more than 3 percent, over the 2007 pledge total.

In 2008, Goddard employees contributed generously beyond their financial goal of $552,000, raising $570,178 over the course of the campaign. With a higher initial goal of $559,000 for 2009, the Goddard CFC is striving to build on the Center's community spirit in giving to the many CFC charities operating in our area. Other 2009 campaign goals are to personally ask 100% of the Goddard civil servant employees to consider contributing to the CFC charities of their choice and to have at least 40 percent of the Center's employees at Greenbelt contribute to the CFC. A 40 percent participation rate will keep Goddard on par with the CFC participation level of the National Capital area—approximately 42 percent.

In conjunction with Nancy Abell, the Center's Associate Director and 2009 Campaign Chair, Team Captains led by Mary McKaig (the 2009 Campaign Manager) have been working together as the Goddard CFC Steering Committee to plan, organize, and conduct this year's campaign. ■

A Long Night Falls Over Saturn's Rings

By Bill Steigerwald

As Saturn's rings orbit the planet, a section is typically in the planet's shadow, experiencing a brief night lasting from 6 to 14 hours. However, once approximately every 15 years, night falls over the entire visible ring system for about four days.

This happens during Saturn's equinox, when the Sun is directly over Saturn's equator. At this time, the rings, which also orbit directly over the planet's equator, appear edge-on to the Sun. During equinox, light from the Sun hits the ring particles at very low angles, accenting their topography and giving us a three-dimensional view of the rings.

"The equinox is a very special geometry, where the Sun is turned off as far as the rings themselves are concerned, and all energy comes from Saturn," said Dr. Michael Flasar of NASA's Goddard Space Flight Center.

During Saturn's latest equinox August 11, the rings reached a temperature of 382 degrees below zero Fahrenheit, the coldest yet observed, as seen by the Composite Infrared Spectrometer (CIRS) instrument on board the *Cassini* spacecraft in orbit around Saturn. CIRS was developed at NASA Goddard, and Flasar is the Principal Investigator for the instrument.

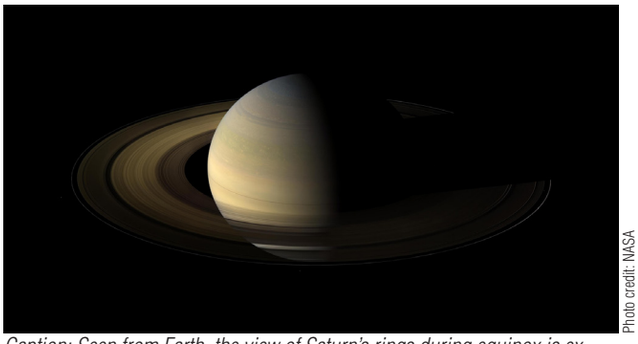

Photo credit: NASA

Caption: Seen from Earth, the view of Saturn's rings during equinox is extremely foreshortened and limited. But in orbit around Saturn, Cassini *had no such problems. From 20 degrees above the ring plane,* Cassini*'s wide angle camera shot 75 exposures in succession for this mosaic showing Saturn, its rings, and a few of its moons on Aug. 12, 2009, beginning about 1.25 days after exact Saturn equinox, when the Sun's disk was exactly overhead at the planet's equator.*

"The whole point of the CIRS observations of Saturn's rings, other than producing some cool pictures, is to learn something about the physical properties of the ring particles: their spin rates, how sluggish they are in storing and radiating heat (a diagnostic of size and composition), and their vertical distribution in the ring 'plane'," said Flasar.

Although the rings are thousands of miles wide, they are only about 30 feet thick. They are made of particles that are mostly water-ice. Scientists continue to debate the rings' origin and age. Some think they could be remnants of a shattered moon or captured comets, while others think they could have formed along with Saturn from the primordial disk of gas and dust that gave birth to our solar system.

"At first glance, Saturn's rings look broad and bland, but then we got close-up images from the *Voyager* flybys, and our reaction was: oh, my gosh, there's structure everywhere. What's going on?" said Dr. Linda Spilker, of NASA's Jet Propulsion Laboratory (JPL) in Pasadena, Calif.

Researchers have discovered that while most of the ring particles are as small as dust and pebbles, there are a few chunks as big as mountains, and even some small moons several miles across embedded in the rings. Instead of orderly orbiting around Saturn, the particles clump together and drift apart, and the rings ripple and warp under the gravitational influence of Saturn's swarm of more than 60 moons.

"The closer we look at the rings, the more complex they get," says Spilker, Deputy Project Scientist for the *Cassini* mission and a Co-Investigator on CIRS. She is leading the instrument team's investigation of the rings. "Because Saturn's rings are so extended, going out to more than twice Saturn's radius (from the cloud tops), the furthest rings get less heat from Saturn than the innermost rings, so the ring temperatures at equinox tend to fall off with distance from Saturn's center," said Flasar.

However, the CIRS team discovered that the A-ring—the outermost of the wide, bright rings—did not cool off as much as expected during the equinox. This might give clues about its structure and evolution. "One possibility is that the gravitational influence of moons outside the A-ring is stirring up waves in it," said Spilker. "These waves could be much higher than the typical thickness of the rings. Since the waves rise above the ring plane, material in the waves would still be exposed to sunlight during the equinox, which would warm up the A-ring more than expected."

"But we have to carefully test this idea with computer models to see if it produces the temperatures we observed with CIRS," adds Spilker. "That's the challenge with CIRS. It's not like seeing a close-up picture of Mars, which can tell you something about its geology right away. We have to look at the CIRS data from different times and Sun angles to see how the ring temperatures are changing, then make computer models to test our theories on what those temperatures say about the rings."

The effort to understand the rings could help us understand our origin. "Our solar system formed from a dusty disk, so by understanding the dynamics in a disk like Saturn's rings, we can gain insight into how Earth and the other planets in our solar system were made," said Spilker.

The equators of both Earth and Saturn are tilted compared to their orbit around the Sun. This tilt makes the Sun appear to rise higher and lower in the sky throughout the year as Earth progresses in its orbit, causing the seasons to change. Likewise, Saturn's tilt makes the Sun appear higher and lower in the sky as Saturn moves in its orbit, which takes about 29.5 years to complete.

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A Long Night Falls Over Saturn's Rings

Continued from Page 8

Saturn experiences two equinoxes per orbit, just as Earth does, when the planet's equator lines up edge-on to its orbital plane, causing the Sun to appear directly over the equator. For a viewer on Saturn, the Sun would seem to move from south to north around the time of the August 11 equinox.

Technically, the equinox is the instant when the Sun appears directly over the equator, but Saturn's situation gives the rings an extended twilight. Saturn is about 10 times farther from the Sun than Earth. Since Saturn is farther from the Sun's gravitational pull, it moves relatively slowly in its orbit compared to Earth, which makes it take longer for the Sun to noticeably appear higher or lower in the sky. Also, even as far away as Saturn, the Sun is large enough to appear as a disk, not a point, according to Spilker.

So, before the August 11 equinox, a viewer embedded in Saturn's rings would have seen sunlight fade as the top edge of the solar disk appeared to touch the rings first. This would be followed by darkness around the equinox as the solar disk slowly crossed the ring plane. Full sunlight would have returned when the Sun's bottom edge rose above the ring plane, about four days from when the sunlight first began to fade.

The *Cassini-Huygens* mission is a cooperative project among NASA and the European and Italian Space Agencies. JPL manages the mission for the Science Mission Directorate at NASA Headquarters in Washington. JPL also designed, developed, and assembled the Cassini orbiter and its two onboard cameras. The imaging team is based at the Space Science Institute, Boulder, Colo. The CIRS team is based at Goddard. CIRS was built by Goddard, with significant hardware contributions from England and France.

For more information about *Cassini*, visit: http://www.nasa.gov/cassini. ■

NASA Retires *Tracking and Data Relay Satellite*

By Susan Hendrix

After a rocky start and then a stellar 26-year performance, NASA's *Tracking and Data Relay Satellite-1* (TDRS-1) is scheduled for decommissioning on October 28.

Communications equipment that links TDRS-1 to the ground has failed. Without this capability, it can no longer relay science data and spacecraft telemetry to ground stations located at the White Sands Complex in Las Cruces, N.M., and on Guam.

"Our immediate plans are to develop a strategy to shut down critical payload systems aboard the satellite," said Space Network Project Manager Roger Flaherty at Goddard Space Flight Center. "Then the team will execute maneuvers to raise TDRS-1's orbit, thus eliminating potential collision dangers with other communications satellites in geosynchronous orbit."

TDRS-1 had many firsts. Its position over the Indian Ocean successfully eliminated the "Zone of Exclusion"—an area where communications with spacecraft were previously impossible—thus providing true global coverage for all TDRS System customers.

In 1998, TDRS-1 garnished worldwide publicity when it provided the first medical teleconferencing link, complete with voice, video, and imaging data from the South Pole. It was used again in July 2002 to provide continuous, dropout-free data during a two-hour telemedicine event involving a physician at the Amundsen-Scott South Pole Station and physicians at the Massachusetts General Hospital in Boston.

"Amazing results from a satellite that almost didn't make it to orbit," said Flaherty.

TDRS-1's upper stage failed upon deployment from the Space Shuttle in April 1983. Engineers at Goddard came to its rescue using the tiny, one-pound thrusters onboard the spacecraft. Over the course of several months, they fired the thrusters to nudge TDRS-1 into its geosynchronous Earth orbit. NASA has used the satellite in ways never expected because its orbit has been inclining almost one degree per year since deployment.

Goddard's Space Network Project provides overall management and direction of the operation and maintenance of the TDRS system, which consists of the on-orbit TDRS, the ground terminal on Guam, and the ground complex at White Sands, N.M.

For more information about the TDRS Program, go to: http://scp.gsfc.nasa.gov/sn/index.htm. ■

Dillard Menchan Retires but Continues Family Tradition

By Dewayne Washington

It was a gathering of recognition and congratulation as members of the NASA Goddard community celebrated the career of Dillard Menchan, Deputy Chief for Education. With a career spanning more than four decades of diverse responsibilities including human resources, equal opportunity, and education, there was a lot of laughter and a few tears.

For Menchan, recognizing the end of his career was no great eye-opener just simply time to go. "I am not being pushed out and there was no great revelation," Menchan said. "While I am in good health, my wife and I plan to do some traveling and I think now is the time to do that." Menchan reflected on more than 42 years of Government service, 32 of those years spent at Goddard. "I feel I have had a terrific opportunity to serve, an opportunity that would not have been afforded me if I had worked elsewhere."

Photo credit: Debora McCallum

Caption: Dillard Menchen welcomes a new group of summer interns.

Menchan began his Goddard career in 1979 as Chief of the Employee Development Branch with responsibilities that included advocating for the rights of others. After eight years and with a desire to do more, Menchan accepted the position of Chief of the Equal Opportunity Program Office. "In that position, I really enjoyed the opportunities to be involved in positive change for numerous, diverse careers at Goddard," he said.

Eligible to retire in 2005, Menchan decided instead to accept one more challenge. His new mission was to provide guidance and to directly influence positive educational opportunities for some of this country's best and brightest students. Menchan's next four years would be filled with new challenges and optimism while surrounded by potential explorers of tomorrow. "My most lasting memory will be the interns we were able to bring to Goddard," he said.

His most notable accomplishment in the education office was the migration of the education programs he initiated within the Equal Employment Opportunity Office. "I was occasionally able to influence a career directly, but indirectly I was often able to make a difference," Menchan said. "I think I was most valued in my ability to enhance careers simply by connecting people with people."

Menchan admits he will miss the opportunities to broker communications and provide guidance to students attempting to navigate the NASA career pipeline. "I am grateful for Mr. Menchan's influence, which has guided my approach to career goals and my integration into the NASA culture," says Dr. Ramsey Smith, a recently hired Goddard scientist. "We should all admire his selflessness and dedication to expanding the future technical and scientific workforce of NASA and our Nation."

Menchan acknowledges his parents' influence on his work in Goddard's education office. "My father, who was a college dean, and my mother, a school teacher, established a mindset of the importance of education," Menchan said. "I respect our teachers and felt it was my responsibility to run interference on the Government bureaucracy, allowing them to do what they do best for the Agency and the Nation."

According to Dr. Robert Gabrys, Chief of the Goddard Education Office, a lot of expertise walked out the door when Menchan retired. "Dillard's retirement leaves a personal and professional void that will be long felt," says Gabrys. "His knowledge of the Agency, Goddard, and the intricacies of the NASA culture made him an invaluable asset for the services that Education offers. His commitment to staff members and youth, his fairness and equity, and his integrity contributed to him being a genuinely outstanding colleague and human being."

Just as it was in 1967, Menchan looks forward to the challenges of a new phase in life. He also looks forward to revealing the importance of education to his grandson Micah, a recent addition to the Menchan family tree. "If the good Lord gives me time, I want to expose him to the enjoyment of doing math problems," he said. "He may not become a scientist or engineer but hopefully he will gain a higher level of curiosity to analytical pursuit."

Photo credit: Debora McCallum

Caption: Menchen addresses students at a buidling dedication ceremony at Capitol College.

Menchan has plenty of time to continue the family tradition of imprinting upon the next generation. A tradition Menchan has practiced for more than four decades within an Agency created to reach for the stars. ■

A Dog Gone Good Vacation

By Elizabeth M. Jarrell

Not every dog born in a Missouri puppy mill is fortunate enough to find herself vacationing at a luxurious dog camp. But Greta Irene, the Miniature Dachshund owned by Rebecca A. Elliott, a Public Affairs Specialist, did just that. Rebecca rescued Greta at a young age knowing her background and proceeded to make up for Greta's rough start in life.

Recently, Rebecca and Greta enjoyed a dream vacation at a specialized dog camp in New England. In addition to delicious food, comfortable accommodations, and a spectacular mountain backdrop, Rebecca and Greta tried all kinds of dog-related activities including classes, workshops, demonstrations, and lectures. Classes included obedience, rally, the AKC Canine Good Citizenship Program, agility, lure coursing, and tracking. Other pastimes included leash-making, spinning dog hair, and animal communication, as well as lectures on nutrition and shelter work.

Many of the classes are based on competitive events held by the American Kennel Club (AKC). According to the AKC, obedience, the foundation for any competitive event, requires that a dog "follow specified routines…and demonstrate willingness and enjoyment while it is working." Lower level obedience allows voice commands, but upper level classes require hand signals often from the other side of a fifty foot ring.

Photo credit: Steve Surfman

Caption: Greta gets put through her paces.

Rally, a recent derivative of obedience, is a sport where the dog follows a course with signs each of which indicates a particular skill to be performed. It is a timed event. Unlike traditional obedience, multiple commands may be given and perfection is not required.

The AKC describes its Canine Good Citizenship Program as being "designed to reward dogs who have good manners at home and in the community." Dogs who successfully complete the 10-step test receive a certificate.

Photo credit: Steve Surfman

Caption: Greta displays her coursing skills.

One of the fastest growing dog sports is agility, which the AKC refers to as "the ultimate game…[where] a dog demonstrates its agile nature and versatility by following cues from the handler through a timed obstacle course of jumps, tunnels, weave poles and other objects." The goal is to complete the course with the fastest time without missing any objects. Multiple voice and hand signals may be given.

One of the lesser known dog sports is lure coursing which the AKC describes as "artificial simulations of live game or open field coursing." Lure coursing is a noncompetitive event where dogs chase an artificial lure that is mechanically moved at a high speed in an open area to simulate real prey. The tests are on a pass or fail basis.

Another little known dog activity is tracking. The AKC requires a dog to "follow the track and either clearly indicate or retrieve an article" or articles in more advanced levels. Certain voice and hand signals are permitted, but the handler may not indicate the location of the track or article. Tracking tests are also on a pass or fail basis.

The leash-making workshop was timely as the latest thing among those who compete with dogs is braided kangaroo leather leashes referred to as leads. The kangaroo leather is dyed or painted in all kinds of colors and may be complemented by a multitude of beads in various sizes, shapes, and colors. As for lectures, Rebecca, who home cooks for Greta, could have given the one on rescue dogs or nutrition herself using Greta as Exhibit A.

Rebecca and Greta returned home determined to title in several dog sports by this time next year. Rebecca has already registered for dog camp with Greta next year. ■

Employee Spotlight: Ted Felsentreger

By Alisha Sutton

If you've walked the trails at Goddard any time over the last 27 years between April and August, chances are at some point you've seen Ted Felsentreger. Ted has been monitoring these nest boxes with a few behind-the-scenes volunteers every spring and summer without fail. Ted worked in Building 16 doing calculations by hand of the orbits of satellites. Ted often walked the trails on Center and noticed someone checking on the nest boxes. This was Chuck Dupree, the Grounds Manager in 1982. Ted became interested and agreed to take over monitoring the nest boxes when Chuck retired in 1983.

For a self-described non-birder to maintain these nest boxes so faithfully over the last few decades is quite an accomplishment, though Ted would never say so himself. The Ted I have come to know over the past several months can be quite shy and unassuming, though his sense of humor peeks out with a fantastic grin often enough. I was fortunate to accompany Ted this spring during his last nest box monitoring season. It was my first spring at Goddard, and is surely one I will not soon forget.

Photo credit: Alisha Sutton

Caption: Ted Felsentreger and one of the 33 nest boxes he's monitored over the past 27 years.

Our preparation for the nesting season began in late March. Ted and I often met midmorning on Thursdays so we could take full advantage of the farm truck. Before making our way to the farm truck, we monitored about ten nest boxes, enough time to get caught up on the week's fishing report. Ted loves to fish. Whether by charter or in his own early 1970's bass boat, Ted catches a lot of fish. He probably frightens a lot of fish as well. On one occasion Ted recounted how he had recently fallen into the Chesapeake Bay then proceeded to fish the better part of the day in wet clothes. Fortunately, he has a great ability to laugh at himself. On another occasion, Ted forewarned me of the smell of gas coming from the trunk of his car. Not to worry, he was heading straight to his boat mechanic afterwards, something about water getting into his gas tank and a dirty carburetor that needed cleaning.

That first outing in March, screwdrivers in hand, Ted and I inspected each of the 33 nest boxes. Our purpose was to see if any needed repairing or replacing, and to clear out overwintering activity of small rodents, birds, and the occasional snake. Early April brought with it the first signs of nesting activity as grass cups appeared in a few of the nest boxes. Ted assured me the upcoming weeks would be worth the first few weeks of inaction. Sure enough, by mid April, the first Eastern Bluebird, Chickadee, and Swallow eggs were laid.

By late May, dozens of nestlings and a few fledglings made each instance of peering into a nest box sensational. I became convinced that one-week-old House Wren nestlings were the most adorable creatures I had ever seen.

Monitoring nest boxes, you learn the temperaments of different species of birds rather quickly. House Wrens and Chickadees were never pleased when you came close to their nest boxes. Until we left the vicinity of their nest boxes, their incessant chastising always made us chuckle, and hurry.

Swallows were the most aerially acrobatic—and hilarious—of them all. The minute we approached one of their nest boxes, they showed no mercy and begin to dive bomb us, one after another. On one occasion, Ted almost lost his hat and I nearly avoided a concussion. That was the only time I ever saw Ted run.

Thankfully, Eastern Bluebirds were a bit calmer, and perched near us with their heads cocked to watch. They waited patiently until we finished, and resumed feeding once we were a suitable distance away. The flurry of nesting activity and our subsequent counting continued through July, almost outlasting the blackberries.

Photo credit: Alisha Sutton

Caption: An Eastern Bluebird and her eggs.

As the season came to a close so did Ted's decision come to hang up his screwdriver. It was time to officially end his semi-retirement and fully retire from Goddard. He had been monitoring the nest boxes since 1982, 12 years while working at Goddard, and 15 years after his retirement in 1995. Ted's foremost reason for leaving the nest box program? Monitoring the nest boxes was interfering with his weekly fishing trips, and frankly, Ted would rather be fishing. ■