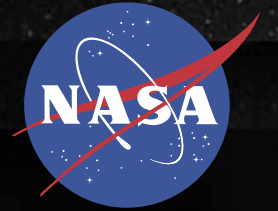


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Goddard Instrument to Map Pluto

By Cynthia O'Carroll

NASA's New Horizons mission will be the first spacecraft to visit the last planet, Pluto and its moon Charon, as early as 2015. On board the compact piano-sized spacecraft will be a Goddard infrared spectrometer as part of the Ralph instrument.

Goddard's infrared spectrometer, the Linear Etalon Imaging Spectral Array (LEISA) will map the chemical composition across the sunlit surfaces of Pluto and its moons, recording the amounts of nitrogen, methane, carbon monoxide, frozen water and other materials, including organic compounds. It will also map surface temperatures by sensing the spectral features of frozen nitrogen, water and carbon monoxide.

The Ralph instrument also provides the vital "eyes" for the mission with the Multispectral Visible Imaging Camera (MVIC), consisting of three black-and-white and four color imagers. Ralph will take images twice daily as New Horizons approaches, flies past and then looks back at the Pluto system. It will also search for clouds and hazes in Pluto's atmosphere, and for rings and additional satellites.

The New Horizons mission will launch from Launch Complex 41 aboard a Lockheed Martin Atlas V rocket from the Cape Canaveral Air Force Station, Fla. New Horizons will be the fastest spacecraft ever launched, reaching lunar orbit distance in just nine hours and passing Jupiter 13 months later.

[Continued on Pg. 12](#)



Image credit: NASA/KSC

Technicians install strips of the New Horizons mission decal on the spacecraft fairing in the Payload Hazardous Servicing Facility. The last strip was installed on the fairing after the spacecraft was delivered to Pad 41 on Dec. 17.

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Cover: Artist rendering of the New Horizons spacecraft

Image Credit: NASA

GoddardView Info

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Editor: Alana Little

Deadlines: News items and brief announcements for publication in the Goddard View must be received by noon of the 1st and 3rd Wednesday of the month. You may submit contributions to the editor via e-mail at alittle@pop100.gsfc.nasa.gov. Ideas for new stories are welcome but will be published as space allows. All submissions are subject to editing.

Goddard Technologies Win Recognition from NASA

By Nancy Pekar

Three technologies developed at NASA Goddard Space Flight Center have received awards from NASA's Inventions and Contributions Board (ICB) for their significant scientific and technical contributions:

- Land Information System (LIS) V.4, developed by Goddard's Christa Peters-Lidard, James Geiger, Luther Lighty, and Susan Olden; Paul Houser (retired); and Sujay Kumar and Yudong Tian of the University of Maryland-Baltimore County (UMBC)
- Low-Cost and High-Quality Carbon Nanotubes, developed by Goddard's Jeannette Benavides and Henning Leidecker
- AutoChem, developed by UMBC's David Lary

Land Information System

A high-performance modeling and data assimilation system, LIS performs local, regional, and global land surface simulations. The software helps enable accurate prediction of water and energy cycles, providing information for water-resource management, weather prediction, air-quality monitoring, and military operations. LIS is being used in major areas of NASA mission support and is employed by other U.S. agencies.

LIS provides great potential for commercial uses such as weather- and hazard-related information and services. Earlier this year, LIS received NASA's prestigious Software of the Year Award, which emphasizes those software innovations that have a positive impact on NASA's mission and other areas of science and technology.

"These awards are a very exciting validation that NASA sees huge potential for LIS both within its own research walls and beyond—in both the larger scientific community and in applications with other agencies and commercial partners," said Dr. Peters-Lidard, who led the LIS development team.

Low-Cost and High-Quality Carbon Nanotubes

Researchers at Goddard Space Flight Center have developed a process for manufacturing single-walled carbon nanotubes (CNTs) based upon helium-arc welding. Because Goddard's process does not use a metal catalyst, it is simpler, safer, and much less expensive than existing methods, enabling the use of CNTs in a wide range of applications.

Many molecules can be used to make nanodevices and nanostructures, but the most promising and powerful are CNTs. A CNT is a tubular form of carbon with a diameter that can be as small as 1 nm in diameter and ranging in length from a few nanometers to the micron range. Current techniques for making CNTs require expensive equipment and processes using metal catalysts, which makes the process complex, dangerous, and expensive.

Compared to the metal catalyst methods, Goddard's process offers high yields at significantly lower production and equipment costs. The single-walled CNTs made with Goddard's method are free of defects since they do not have to be boiled in acid to remove the metal catalyst. Also, because the CNTs disperse extremely well in water or ethanol while impurities do not, the impurities settle to the bottom where they are easily removed, resulting in a product that is 100 percent nanotubes.

This innovative process opens the door to making the theories behind nanotechnology a practical reality.

AutoChem

AutoChem is a ground-breaking data assimilation system that performs four-dimensional information about chemical variations. This first-in-the-world, user-friendly system enables automatic code generation, symbolic differentiation, analysis, documentation and Web creation. Most importantly, AutoChem's capabilities drastically reduce the time it takes to create complex models. Models that used to take several years to create now can be generated in just seconds.

AutoChem can be used in ozone assessments, to study chemistry-climate interactions and interstellar chemistry, to conduct air-quality studies, and for modeling satellite data intercomparison. AutoChem also is being used in a number of pioneering studies to optimize Earth observation. Because AutoChem can help specifically define the location and time of observations so as to obtain the maximum benefits, NASA missions and scientific investigations can be performed at a significant cost savings.

Described as pioneering in the *Quarterly Journal of the Royal Meteorological Society* and the *Journal of Geophysical Research – Atmospheres*, AutoChem has widespread applications in numerous areas. For example, AutoChem can easily be used in medical and other biological applications in metabolic pathway modeling and simulation. ■

Did You Know?

The Baby Stroller

NASA research on lightweight materials to lighten the weight of spacecraft now helps us reduce weight in all kinds of everyday vehicles.

Goddard's Investment in Technology Pays Dividends

By Lori Keeseey

Majority of New Business Winners Attributed Success to Previous Technology–Investment Awards

Results from a recent survey conducted by the Goddard Technology Management Office (GTMO) have confirmed that Goddard's Technology–Investment programs are making a significant impact on the amount and value of new business coming into the Goddard Space Flight Center.

In FY05, the Goddard New Opportunities Office reported the award of 26 new proposals, valued at about \$234 million. Sixty-five percent of the winners attributed their success to having previously received Goddard technology–development funding, which they used to advance key technologies and capabilities important for capturing the new business, according to the survey. The corresponding awards were valued at \$176 million or 75 percent of the total of new business.

After the New Opportunities Office released its report, GTMO conducted its informal survey and found that Goddard principal investigators had won an additional \$11.5 million in new business. (These figures represent what was proposed; actual amount of final award may vary.) That would bring the total of new business attributable to prior technology investments to about \$187.5 million in FY05.

GTMO conducted the informal survey in the fall to assess the impact of the Center's Technology–Investment programs on new business wins. In addition to contacting the FY05 new business winners, GTMO sent survey questions to past winners of its Internal Research and Development (IRAD) program, which Goddard created in the late 1990s to help make the Center more competitive. Of the 88 principal investigators contacted, 46 responded.

"Because not everyone participated in our informal survey, it's possible that Goddard's IRAD, Core Capabilities, and Bid and Proposal funding played an even greater role in the award of new business," said Goddard Acting Chief Technologist Peter Hughes, who manages IRAD and oversees Goddard's other investment programs. "Even so, our results validate what we long believed — we are seeing strong returns on our Technology–Investment programs."

A full-length article on the return on the Center's technology investments is available in the winter issue of *Goddard Tech Trends*. For more information on Goddard's Technology–Investment programs, please visit:

<http://gsfctechnology.gsfc.nasa.gov> ■

Proposal Opportunities

Research Opportunities in Space and Earth Science (ROSES)

Earth System Science Fellowship/06

Released: 2005-10-01

Proposal Due: 2006-02-01

Hubble Space Telescope–Cycle 15

Call for Proposals

Released: 2005-10-05

Chandra X-Ray Observatory – Cycle 8 Call for Proposals

Released: 2005-12-16

Proposal Due: 2006-03-16

Discovery Program 2006 and Missions of Opportunity

Released: 2006-01-03

NOI: 2006-03-06

Proposal Due Date: 2006-04-05

Earth System Science Fellowship/06

Released: 2005-10-01

Proposal Due Date: 2006-02-01

Research Opportunities in Space and Earth Sciences - 2005

Released: 2005-01-28

Spitzer Space Telescope – Cycle 3 Call for Proposals

Released: 2005-11-01

Proposal Due Date: 2006-02-16

For more information contact the New Opportunities Office
x6-5442

GSFC Employees Give from the Heart

By Marjorie Ott

“We make a living by what we get, but we make a life by what we give.” — Winston Churchill



Goddard employees at the Greenbelt campus certainly gave from the heart during the 2005 Combined Federal Campaign. This year's campaign started with a special fundraising effort for the victims of Hurricane Katrina, and we raised \$5,712 in less than two weeks during September — even

before the official start of the GSFC CFC Campaign. The funds raised during this effort counted toward our goal of \$500,000.

At least one Goddard employee, who also happens to be a 2005 CFC Directorate Team Captain, volunteered to help with disaster relief with the Federal Emergency Management Administration (FEMA): Ms. Gaynell Johnson of Code 155. Since Gaynell has family and friends in the Gulf Coast area of Mississippi, the hurricane tragedy “hit home” with her. Not only did Gaynell help to raise funds for the relief effort, but she and her husband also drove supplies down to the devastated areas before she deployed with FEMA. Gaynell and her husband are true CFC Heroes.

Goddard, in cooperation with the Marshall Space Flight Center and CFC National Capital Area, developed a way for Goddard employees to pledge contributions using WebTADS, Goddard's time and attendance software system for processing payroll. This was a new utility this year, and was a great success! Almost 55 percent of our total contributions were done using WebTADS, all by payroll deduction. Employees said they found it relatively easy to use and they liked the privacy of being able to pledge online.

Despite media talk of “donor fatigue” after Hurricane Katrina, Goddard employees dug deep into their wallets. Our final tally, which has yet to be fully audited, is approximately \$522,000. Our deposits will be fully audited later this month.

The CFC National Capital Area gives awards to Federal agencies for per capita gift or participation rate. Several Goddard directorates have qualified for the President's Chairman's, and Merit awards, which will be presented soon.

Many thanks to all the donors, Keyworkers, Team Captains, Chair and Co-Chair, and support personnel! We could not have accomplished our goal without your support.

Goddard's Top 25 Charities in 2005:

1. American Red Cross
2. American Cancer Society
3. SOME
4. Goddard Child Development Center
5. The Nature Conservancy
6. CARE
7. St. Jude Children's Research Hospital
8. WETA (Greater Washington Educational Telecommunications Association)
9. Catholic Relief Services - USCCB
10. Associated Catholic Charities
11. United Negro College Fund (UNCF)
12. American Diabetes Association
13. Hospice of the Chesapeake
14. Capital Area Food Bank, Inc.
15. Christian Charities USA
16. Undesignated Funds*
17. Children's Hospital Foundation of Washington, DC
18. Fish of Laurel, Inc.
19. WAMU American University
20. Cardinals Appeal - Catholic Archdiocese of Washington
21. MAP International
22. American Heart Association
23. Salvation Army World Service Office (SAWSO)
24. Alzheimer's Association
25. The Sierra Club Foundation

Did You Know?

37.7 percent of Goddard-Greenbelt employees (1,020 of 2,705) contributed to CFC in 2005

“True heroism is remarkably sober, very undramatic. It is not the urge to surpass all others at whatever cost, but the urge to serve others, at whatever cost.” — Arthur Ashe

From the Basement to the Sky: Goddard's Hidden Mirror Lab

By Christopher Wanjek

Melinda Hong must have walked the path a thousand times. On any given workday, she and her colleagues emerge from the X-ray mirror laboratory in the basement of Building 2 with a fresh batch of X-ray foils, which she examines one by one in another lab two floors up.

Like newly laid eggs, these foils—thin, curved sheets of gold and aluminum about as wide and tall as an outstretched hand—are carefully carried up the steps and down the hallway in a special basket. If they pass inspection, the foils will be combined with over a thousand others to make a world-class X-ray mirror.

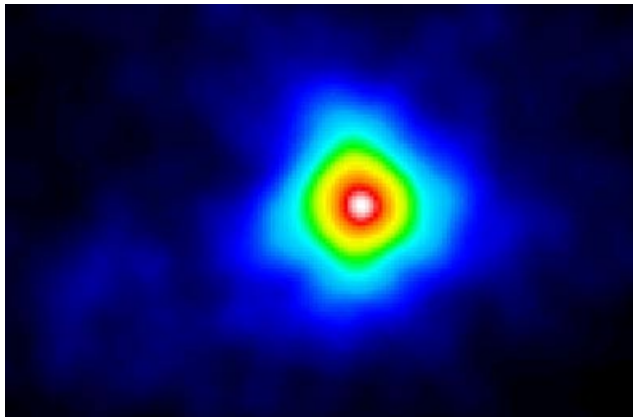


Image credit: NASA/Nagoya University

This is a false-color image showing X-ray intensity from white (brightest) to blue (faintest). This is a two-star system, in which a pulsar (about 20 miles across) orbits star larger than our Sun. From our distant vantage point, the system appears as a single point.

During peak production to meet the Suzaku (Astro-E2) deadline, the lab was banging out 24 foils each day around the clock for 60 weeks. That's over 8,000 foils. . . and countless journeys back and forth with the egg basket—another example of important work at Goddard that seems to take place in the background. Goddard's Peter Serlemitsos founded and built up the mirror lab over the last three decades.

For X-ray astronomers, simple mirrors won't do. X-rays are far more energetic than visible light and would ricochet randomly or even pass through the finely polished mirrors on observatories such as Hubble. To focus X-rays onto a detector, astronomers need mirrors placed at a shallow angle. If positioned correctly, X-rays will reflect off these mirrors like a stone skipping on water.

During its "down time" between missions, the lab hopes to construct better foils and align them just right. "Making the perfect foil, or putting them together: I don't know which is harder," said Yang Soong, who oversees the development process.

The foil design is ingenious, a method to provide inexpensive and lightweight mirrors for X-ray satellites. NASA's Chandra Observatory has exquisite resolution, less than one arc second, but at a price: Chandra's tube-shaped mirror weighs nearly a ton and cost hundreds of millions of dollars.

Goddard's X-ray multi-piece mirrors are only about 20 kilograms. Each foil on Suzaku is only slightly thicker than a human hair, with a 150-micron backing of aluminum and a 0.2-micron coating of gold. What the foil lacks in resolution it gains in collection area. The foils are arranged in concentric circles to maximize the space available to reflect X-rays.

The mirror lab is heading into new territory in constructing mirrors for higher-energy X-ray missions, such as the Goddard-based InFOCuS balloon experiment, the proposed Japanese Astro-G mission, and NASA's Constellation-X. X-ray photons of higher energy are even more difficult to focus.

To handle these photons, the lab is constructing foils with nearly 100 layers of alternating materials, such as carbon and platinum, still only a micron thick combined. X-rays can get reflected by different layers. This has been tested on InFOCuS, which produced its first image during a 2004 flight.

Kai-Wing Chan works on the fabrication process to determine the thickness and type of foil coating needed. He says new X-ray missions are calling for larger mirrors, perhaps 50 or 60 centimeters across instead of Suzaku's 40-cm breadth, to dramatically increase collection area. There's room for improvement to increase resolution. One of the lab's goals is to limit movement once the foils are fixed.

Constellation-X could have a 10-fold increase in spectral resolution compared to current missions. This would allow scientists to watch time slow down and space itself warp near the edge of a black hole. And the mirror technology to do so is being perfected now, without fanfare, in a basement at Goddard. ■

Partnerships to Put Nanotechnology to Work Fast

By Nancy Pekar

As we head into the new year, Goddard is continuing to take a leadership role in the mid-Atlantic region in the area of applied nanotechnology. "This is really an exciting time for Goddard," said Dan Powell, who heads the Center's nanotechnology research. "We (applied nanotech developers in the mid-Atlantic region) are poised to lead the nation, if not the world, in applied nanotechnology development."

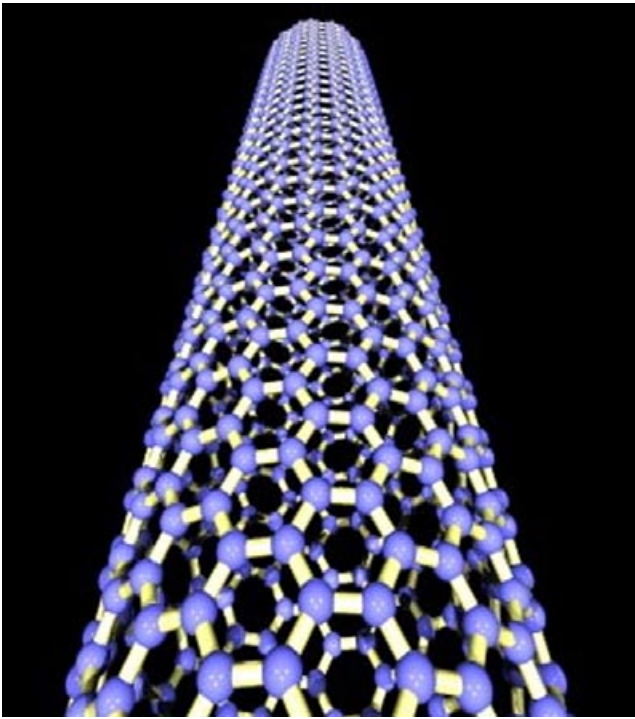


Image credit: NASA

Computer model of a single-walled nanotube

Nanotechnology—that is, devices with atomic-scale features and structures thousands of times smaller than the average human hair—is widely regarded as the next big area of scientific and technological advancement. In the years ahead, nanotechnology advancements for NASA will lead to plastics that are many times stronger and significantly lighter than today's materials. Astronaut monitoring systems at the nano level could be used to detect cancer or for at-home health monitoring. Even fuel cells in the emerging hydrogen economy likely will make use of nanotechnology. The challenge is to get the ideas onto the drawing board and into spacecraft, and that's where Goddard is really making an impact.

For the past year or so, Goddard has been putting Space Act Agreements and Memoranda of Understanding (MOU) in place with some of the leading research institutions in the mid-Atlantic, including the Army Research Lab at Adelphi, Lehigh University in Pennsylvania, the National Institute of Standards and Technology, the University of Maryland at College Park, and others.

"These partnerships provide a framework for collaborative research," said Mr. Powell. "Later this month, Goddard will bring all of these organizations together to identify specific nano projects and technologies that can be developed and then put into direct application at NASA."

Seeking to marry significant scientific advances with real-world engineering is something Goddard has been working on with Ames Research Center for several years. "The research centers give us pieces of the puzzle which we put together at our flight center," Mr. Powell explained. "We then take those pieces and assemble them into a picture that is of interest and value to the scientists we support."

According to Ames's Dr. Meyya Meyyappan, "It is important for us to work with mission centers like Goddard, because they can take whatever we do and convert it into deployable technology. This can only happen with the partnership between a research center and a mission center."

As the collaboration between Ames and Goddard continues, these efforts will be augmented by the development of enabling technologies with the other partner organizations. Goddard also is partnering with the State of Maryland's Department of Business and Economic Development to understand the economic impact of nanotechnology on the region and explore ways to enhance the region's business and technical strength in the field.

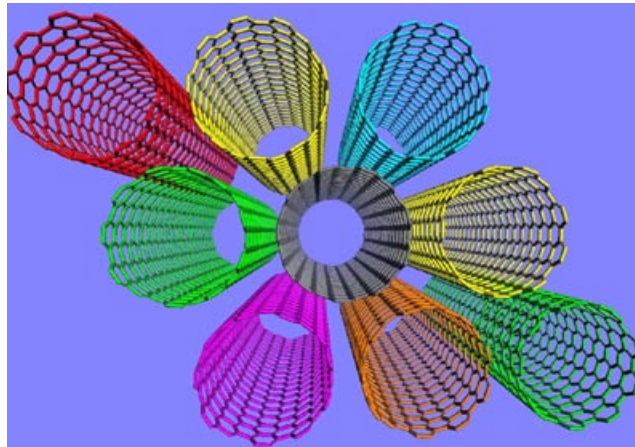


Image credit: NASA

Array of aligned nanotubes

"To pursue this kind of accelerated, collaborative development with near-term impacts is highly unusual and really sets Goddard apart," said Mr. Powell.

Watch for more information about Goddard's role as a leader in applied nanotechnology in upcoming issues of *Goddard View*. ■

Goddard Creates Forest Partnership

By Chuck Gates

The State of Maryland, in partnership with four federal land-holding agencies and the Center for Chesapeake Communities, has pledged to develop comprehensive and coordinated strategies for the restoration, conservation and stewardship of the combined landscape they manage in the Baltimore-Washington metropolitan corridor.

Collectively, the State of Maryland, the U.S. Department of Agriculture Beltsville Agricultural Research Center, the U.S. Fish and Wildlife Service Patuxent Research Refuge, the NASA/Goddard Space Flight Center and the U.S. Army Fort George G. Meade own and manage over 40 square miles of land, 64% of which is either forested or wetlands.

Representatives from each of these groups will sign a Memorandum of Understanding (MOU) on January 23, at the Patuxent Research Refuge National Wildlife Visitor's Center. The signing marks the formation of the Baltimore Washington Partners for Forest Stewardship which seeks to expand tree canopy cover, conserve and improve wildlife habitat, reduce nutrient and sediment pollution to the Chesapeake Bay, promote coordinated land management and collaborative scientific research at these facilities and offer environmental education opportunities to the public.

"These unique ecological resources are among the last significant tracts of contiguous forest land in this highly urbanized region," according to Secretary of Natural Resources C. Ronald Franks. "These lands are critical elements of the Maryland's Green Infrastructure Network and provide important services to Marylanders such as clean air and water, soil erosion and flood control, biodiversity and recreational and educational opportunities."

The Partnership highlights a collaborative response to the Chesapeake Bay Program's Chesapeake 2000 Agreement which calls for all government agencies to lead by example. One of the first actions of the Partnership will include the recruitment of other adjacent landholders to join them in the development of a comprehensive Forest Stewardship Plan.

The Maryland Department of Natural Resources (DNR) is the state agency responsible for providing natural and living resource-related services to citizens and visitors. DNR manages more than 446,000 acres of public lands and 17,000 miles of waterways, along with Maryland's forests, fisheries and wildlife for maximum environmental, economic and quality of life benefits. A national leader in land conservation, DNR-managed parks and natural, historic and cultural resources attract 11 million visitors annually. DNR is the lead agency in Maryland's effort to restore the Chesapeake Bay, the state's number one environmental priority.

For more information, please visit: www.dnr.Maryland.gov ■

Space Weather Day Outreach

By Laura Ratta

Most students know how weather can affect their lives here on earth—bringing an umbrella when rain is in the forecast or having school canceled because of snow, but what about Space Weather? How can it affect us here on our planet as well as astronauts in space? A hundred local middle school students got the answers first hand at a special Space Weather Day Outreach event at the Goddard Visitor Center on November 28, 2005.

The outreach event was developed and coordinated by Goddard's STP/LWS Education Outreach program to encourage student interest in Space Weather, the interaction of the sun with the earth, and space science. Former NASA scientist, Dr. Art Poland, currently with George Mason University, provided an overview of Space Weather to kick off the day's events. Students and their teachers learned about Coronal Mass Ejections, Solar Storms, Aurora's, the Earth's Magnetosphere and other energy emitted by our star the sun.



Photo Credit: Debbie McCallum

Students playing the space radiation game

Scientists and education specialists from STP/LWS, STEREO, SDO, SET, and SOHO then took over and presented hands-on activities such as a Spectrometer Lab, a Space Radiation board game, and using special UV sensitive beads to show the affects of UV radiation.

"I was impressed by how much some of the students already knew about the sun and how it affects them," said Omar Eaton, STP/LWS Education Specialist. "They were interested to learn more about the weather the sun generates, particularly when I told them it can affect their cell phones and X-boxes!"

For more information on Space Weather and other educational resources, please visit: <http://stargazers.gsfc.nasa.gov> ■

The Time to Apply is Now!

By Amy Pruett

Students, you are on notice! January 31 is the deadline for high school, undergraduate and graduate students to apply for an exciting, intellectually stimulating internship at Goddard for the summer 2006 session.

From the months of June to August, hundreds of students flood Goddard grounds every year participating in many science and technology programs such as the NASA GSFC High School Internship Program (HIP) which gives high school students, of at least 16 years, intrigued with science and engineering experience in a technical workplace environment. Partnered with a scientist or engineer in a laboratory setting at GSFC or Wallops Flight Facility (WFF), an intern acquires invaluable skills and knowledge during the flexible three to ten week program, while working alongside their mentor and becoming actively involved in challenging projects.

The NASA Robotics Academy pulls in undergraduate and graduate students with an interest in the singular field of artificial intelligence. Ideal for individuals with a history of participation in FIRST Robotics Competition, Botball, or similar activities, the internship provides an individual with a perfect segue for his or her hobby into the world of professional robotics. The program splits students into teams that consist of three rising freshman or sophomore undergraduate students as well as an advanced undergraduate or graduate student with a curricular background in Robotics. Mentors oversee the challenges and projects. During the ten-week program, students are provided housing at a fraternity house at the University of Maryland, College Park and are required to participate in enriching activities such as group projects, lectures, field trips, and meetings with leaders in the field of robotics.

The Summer Institute in Engineering and Computer Application (SIECA) targets undergraduate and graduate minorities in computer science and related disciplines. The ten-week program places participants with a senior scientist, allowing them to gain real world experience in their technical field. Similar to many Goddard internship programs, SIECA's coordinators designed the program, hoping to inspire its participants to pursue additional schooling in their fields, and gain an increased understanding of NASA, its mission, and Goddard's role in achieving the administration's goals.

So, the entire nation has been notified of the internship opportunities at Goddard via venues such as magazine articles like the one appearing in a January 2006 issue of the international weekly magazine, *Nature*. If a young person you know is interested in a NASA internship tell them not to delay in submitting an internship application to <http://university.gsfc.nasa.gov/application/> before the chance to have a remarkable summer passes.

For additional information, visit:

<http://university.gsfc.nasa.gov/>

<http://university.gsfc.nasa.gov/application/> ■

Touch the Sun

By Adam Mahone

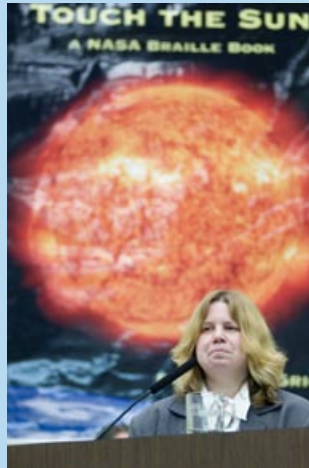


Photo Credit: Chris Gunn

Author of *Touch the Sun*, Noreen Grice

Essentially all individuals are visually impaired when it comes to solar science, but as a result of the recently premiered, NASA Braille book, *Touch the Sun* by Noreen Grice, everyone has access to new perspectives of our star. On Friday, December 2, 2005, NASA's Goddard Space Flight Center, in conjunction with the National Federation of the

Blind (NFB), hosted the premier of the tactile astronomy book at the NFB Jernigan Institute in Baltimore, Maryland. Goddard presented an exhibit at the celebration and passed out information on the center's solar science activities for the attendees of the *Touch the Sun* premier.

Touch the Sun creatively incorporates Braille, tactile and large-print descriptions that accompany each of the book's 16 photographs taken from imagery produced by SOHO, provided by Goddard. Also featured is a close-up of a sunspot from the National Solar Observatory at Sacramento Peak in New Mexico. Blind youth attending the event received a free copy and had the opportunity to experience the book through interactive activities with Goddard scientists and blind mentors.

"*Touch the Sun* is a universally designed Braille book for readers of all visual abilities. You can explore the sun with embossed color pictures of swirling gas currents, dark sunspots, curving magnetic fields and explosive eruptions," says Grice.

"Invisible magnetic fields rule the violent solar activity that generates space weather. We are all blind to magnetic fields, so the visually impaired can be just as successful as the sighted in solar science," says Goddard scientist Dr. Joseph Gurman who collaborated with Dr. Steele Hill, SOHO imaging specialist, to select the images and edit the scientific content.

Touch the Sun was funded by a partnership between NASA, the Lockheed Martin Corporation Advanced Technology Center, and the Stanford Solar Center. The View International Foundation will distribute the book in collaboration with the NFB National Center for Blind Youth in Science.

For more information on *Touch the Sun* by Noreen Grice, please visit: http://www.nasa.gov/vision/universe/solarsystem/touch_sun.html



Farewell to IVV Director: Dr. Nelson Keeler

By John Marinaro

Under Ned's leadership, the Independent Verification and Validation (IV&V) program and associated activities in support of our most important agency missions have reached new heights of performance, efficiency and value added. Our program managers are fighting each other for our limited IV&V resources...three years ago they were whining, "aw, do we have to do IV&V?" That is amazing progress, and Ned made it happen. He will be missed. — Bryan O'Connor, NASA OSMA Chief Safety and Mission Assurance Officer

In late December of 2005, IV&V Director, Dr. Ned Keeler, gathered his staff around him to announce his decision to accept a position as the Director of Aviation Programs at the Volpe National Transportation Systems Center in Cambridge, Massachusetts. Soon to leave his team and his beautiful mountainside home in West Virginia for Boston, he shared his belief that the team he was leaving behind was well prepared to take on any and all challenges before them to fully participate in NASA's vision and mission to return to the moon and explore Mars and beyond.

Since becoming Facility Director in June, 2001, Ned's leadership, dedication and initiative have resulted in encouraging and enabling the IV&V team to accept those challenges by continually expanding the Facility's contributions to the success of the Agency. Since his arrival, Ned has led the IV&V Program into a much more valued position within the Agency. When confronted with initial customer skepticism about the value of IV&V, Ned implemented and actively participated in customer dialogue forums to identify and resolve concerns about IV&V. With proactive forums at both JPL and GSFC, the relationships, performance and recognition of IV&V contributions have greatly improved in general and specifically on robotic missions at those Centers. The performance of IV&V on robotic missions has also improved under his leadership. Due in large part to this achievement, IV&V has been established by NASA as an agency-level program. He serves as the Agency IV&V Program Manager, reporting both to the GSFC Center Director and the NASA OSMA Chief Safety and Mission Assurance Officer.

Ned has led the IV&V Facility team and its regional and local community partners with determination and distinction, never giving quarter to mediocrity and always encouraging excellence. His sincere interest and commitment to individual and organizational success leaves IV&V a more value-driven, strategically-positioned, and more highly trained organization. The IV&V team is committed to ensuring that their work will continue to be a legacy of his leadership for many years to come. ■

About Dr. Nelson "Ned" Keeler

By John Marinaro



Photo Credit: IVV

Dr. Nelson "Ned" Keeler, director of the NASA Independent Verification and Validation (IV&V) Facility will step down, January 20, 2006, to take a position as Director of Aviation Programs at the Volpe National Transportation Systems Center in Cambridge, Massachusetts.

Dr. Keeler, a native of Connecticut, was commissioned as an officer of the United States Coast Guard (USCG) Academy, received his aviator's wings in 1965 and amassed over 6,000 pilot hours during his career. He was a commander of a USCG Air Station and the service's only Research and Development Center, which resulted in the award of a Legion of Merit medal and recognition both nationally and internationally.

Dr. Keeler joined NASA, first serving in the Space Station Freedom program and then in the Office of Space Flight's Advanced Launch Technology and Advanced Flight Systems programs. Dr. Keeler then left NASA for private industry, first working for Stanford Telecommunications as its Navigation Department Manager, and then to GTECH Corporation as Projects Director, before returning to NASA in his most recent assignment as IV&V Facility director. ■

Interview with Diversity Champion: Mike Ryschkewitsch

By Alana Little

Goddard View Editor-in-Chief sat down recently with the Special Assistant for Diversity Sharon Wong, and newly appointed Deputy Director and Diversity Champion Mike Ryschkewitsch to talk about diversity at Goddard. Mike shared personal thoughts and perspectives and his vision for diversity.

How has your background/life experience influenced your views on diversity today?

Interestingly enough, this is something I've thought about a good bit over the years. One of my grandfathers was born in Russia before the Russian revolution and left to go to Germany, where he spent time in an internment camp. I heard a lot of family stories about things that went on. There were a lot of hard questions and no clear answers. I always wanted to know what did people know and what did they not know? You ask yourself, how can something that awful happen to people? There is no easy answer to this question and there are many historical accidents, but when you have good people that act out of fear and focus only on their tiny world then bad things can happen. It's important for me to have the opportunity to speak out about something when it isn't right and to encourage others to speak out as well. It is the first voice that speaks that is hard.

How do you define diversity?

Diversity is an appreciation for two things. First, it is being aware that we all have biases and prejudices that are a combination of our total life experiences. We must actively watch out for these so they don't lead us down a road that will allow us to minimize someone else's contribution. Second, it is actively understanding that because people have different sets of life experiences, every one of us will have a slightly different picture of the world. By itself, one view may not give the full picture, but if you piece them together then you can start to get a more complete picture. That's what diversity is.

Why do we have a business case for diversity?

I want to be able to work at a place that is fair, inclusive, open and where people are treated with respect. As an example, Goddard, in the early 1960's, was made up of mostly white males...period. There may have been two females in the scientific and technical workforce. That's no longer the world we live in. We need to get the best minds and the most committed people to continue to be able to do the hard work we need to do, so we need to expand where we are looking. If we happen to go to an Historically Black College/University (HBCU) and see the kid that's going to help us build the next James Webb Space Telescope (JWST) then we need to be a place where he/she wants to come and work, and for that we need to have other people that look like them working here. At the very least they should always be able to find people here who are welcoming and accepting of them.

From your perspective, what are the challenges in becoming an equitable and inclusive culture?

It takes work, and it's not easy. When we talk about interview panels and posting GOBBS ads, all of those things take time and effort. We all like to

think we know a lot of people around here and when a job comes up we say, 'Oh, I know three people that could do that in a heartbeat.' It takes time to post a GOBBS add and find three people that are just as good but whom we don't know. We need new voices, new thoughts and people who are coming in with new perspectives. New people can say, 'why do you do it that way?' Just that question can be enough to change how we do things.



Photo Credit: Chris Gunn

What is your vision for diversity at Goddard?

My vision for Goddard is that people continue to think about diversity, and when they do, they should realize that there are little things that they can do better. It's like safety. You can be focused on safety all the time, but one day you're so focused on getting from point A to point B that you slip up. If you're in a good environment you will work with someone who will say 'hang on, you're about to do something dumb.' That's what a different perspective can bring. I want Goddard to be a self-supporting culture that way. We also need multiple communication paths. This is critical. There are a lot of pieces, this isn't a problem you ever define cleanly and it's never something you can completely solve. It's really about the openness that everyone can bring to a discussion. But we must be able to respect, appreciate and value our differences, and understand that everyone can contribute and bring something to the table.

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Goddard Instrument to Map Pluto

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The spacecraft, designed and built by Johns Hopkins University Applied Physics Laboratory in Laurel, Md., includes seven science instruments developed under direction of Southwest Research Institute. The suite of instruments includes imaging infrared and ultraviolet spectrometers, a multi-color camera, a long-range telescopic camera, two particle spectrometers, a space-dust detector and a radio science experiment. Together these instruments will shed light on the bodies' surface properties, geology, interior makeup and atmospheres.

The spacecraft will "sleep" in electronic hibernation for much of the cruise to Pluto. Operators will turn off all but the most critical electronic systems and monitor the spacecraft once a year to check out critical systems, calibrate instruments and perform course corrections, if necessary.

The spacecraft will send back a beacon signal each week to give operators an instant read on spacecraft health. The entire spacecraft, drawing electricity from a single radioisotope thermoelectric generator, operates on less power than a pair of 100-watt household light bulbs. ■

Interview with Diversity Champion: Mike Ryschkewitsch

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How will you demonstrate commitment to diversity?

I plan to constantly make sure we're always walking the talk about diversity, participating in the Diversity Dialogue (DDP), using GOBBS to give the widest possible dissemination of available opportunities, holding our managers/supervisors/leaders accountable for diversity, and letting people know we want to hear what they have to say. I want to guarantee that when the advisory groups and other employees and entities on Center are talking, we are not only listening, but also value their input. We also need to convey that we are going to them for their ideas and help, because we're all in this together as a team. ■

Employee Spotlight

Hsiao Smith

By Alana Little



Photo Credit: Chris Gullm

You may not see a lot of Hsiao Smith, Hubble Space Telescope (HST) Instrument Development Manager, on Center but she is always working hard behind the scenes doing exciting things that will impact the HST mission.

Hsiao came to Goddard as a high school senior in 1984 on a fellowship program. "It was a fantastic opportunity," she said "I had done well in math and science but had no idea what I wanted to major in college...the hands on experience was invaluable and is what made me want to become an engineer."

Currently Hsiao is working on the HST Cosmic Origins Spectrograph (COS) instrument designed to observe faint astronomical point sources and the Wide Field Camera 3 specially designed to provide higher quality images previously impossible by other instruments.

Hsiao has advice for other young ladies interested in a career in science and engineering:

- Talk to engineers and scientists and find out what they do (scientists and engineers love talking about their work).
- Apply for an internship or Co-Op so you can gain some experience.

During Hsiao's internship at GSFC, she changed her major from Mechanical to Electrical Engineering. When she realized that Mechanical Engineering wasn't a fit for her she literally flipped through the Goddard directory and called Electrical Engineers to find out what they were working on. When she found the position that interested her, she took the steps that would get her into that position.

Hsiao has been working on HST for eight years; she enjoys her job and feels fortunate to be a part of this outstanding team. Hsiao believes, "HST is the best project on Center." ■