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Ready, Set, Pledge: NASA Gears Up for Another Year of Charitable Giving

By Jonathan Root



Ready, Set, Pledge! Goddard is ready and set to continue its tradition of charitable giving with the launch of its 2007 Combined Federal Campaign.

This year's Combined Federal Campaign (CFC) kick-off event was held on October 15 in the Building 3 Goett Auditorium and featured John Mather, Goddard's Nobel Prize winner.

Several charities and other speakers were on hand to inspire your participation in the CFC. In addition to learning about CFC charities, those who attended enjoyed refreshments and baked goods for sale (all proceeds went to support the CFC)!

The CFC, established during President 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. Last year, the CFC raised \$271.6 million nationwide with Federal employees in the Washington, D.C. area contributing nearly \$60 million.

In 2006, Goddard employees contributed generously beyond their financial goal of \$525,000, raising \$564,528 over the course of the campaign. With a higher initial goal of \$540,000 for 2007, 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 2007 campaign goals are to personally ask 100% of the Goddard civil servant employees to consider contributing to CFC charities of their choice, and to have at least 38 percent of the Center's employees at Greenbelt contribute to the CFC.

Broad employee participation is key to a successful campaign and integral to the Goddard campaign theme for this year: "We Make The Goddard Community Stronger Through Giving Together!" CFC contributions are voluntary (and tax deductible) and may be easily pledged from October 14 through November 24 via the electronic WebTADS Time and Attendance System or by submitting the paper pledge card, which will be distributed to all employees. Volunteer CFC Keyworkers from throughout the Goddard community will also ensure that all employees receive the 2007 Catalog of Caring, which provides information on more than 3,600 participating charities—it's also available online at <http://www.cfcna.org>.

In conjunction with Nancy Abell, the Center's Associate Director and 2007 Campaign Chair, Team Captains led by Jonathan Root, the 2007 Campaign Manager, have been working together as the Goddard CFC Steering Committee to plan, organize, and conduct this year's campaign.

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Cover caption: Engineers check NASA's Wide Field Camera 3 instrument to ensure it will fit properly in the protective enclosure that will carry it to orbit aboard the space shuttle next summer for Servicing Mission 4 to the *Hubble* Space Telescope.

Image credit: NASA

GoddardView Info

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Managing Editor: Trusilla Steele

Editor: Alana Little

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New Science Instruments for *Hubble*

By Dana Martinez

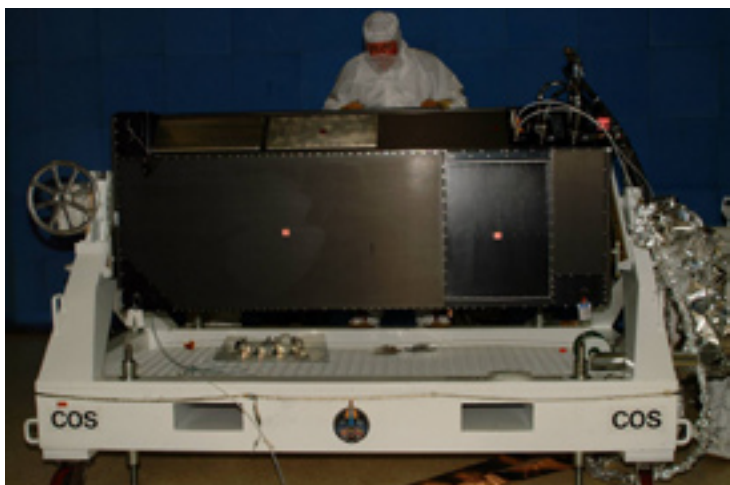


Photo credit: NASA

Caption: The Cosmic Origins Spectrograph instrument undergoes testing to ensure it will perform as required. Astronauts will install the instrument during Servicing Mission 4 to the Hubble Space Telescope.

To enhance the *Hubble* Space Telescope's science capabilities, two new instruments—the Wide Field Camera 3 and the Cosmic Origins Spectrograph (COS)—will be installed during the fifth and final shuttle servicing mission to the observatory in August 2008.

Wide Field Camera 3

The new Wide Field Camera 3 will replace the existing Wide Field Planetary Camera 2 that astronauts installed on Servicing Mission 1 in 1993. By capturing high-resolution images over a wide range of wavelengths, the new camera's capabilities will far surpass those of the previous cameras on *Hubble*.

What makes Wide Field Camera 3 superior is its ability to cover a range from the ultraviolet, through visible light, all the way into near infrared, and everything in between. The new camera has a more panchromatic range, meaning that it is able to cover a broader range of colors all at the same time, which distinguishes it as truly remarkable. The outstanding images that Wide Field Camera 3 is designed to produce will greatly contribute to the success of *Hubble's* scientific voyage.

In order to determine the overall quality of the images that this new camera will produce, several factors were considered. The evaluation is similar to the one consumers generally use when shopping for a new digital camera. Most people want a camera that will produce high quality pictures, in the most efficient manner, and within their particular budget.

"Picture the standard camera you use for home photography—is it a one megapixel camera, or a four megapixel camera?" asked *Hubble* WFC3 Instrument Scientist Randy Kimble.

"Naturally, the bigger the format the more detail in the picture and the more field you can cover. The new Wide Field Camera 3 has a larger field of view as well as higher sensitivity to fainter objects."

As a result of these improvements, astronomers will get a better advantage in surveying the sky faster and seeing faint objects more quickly. Although the same wavelengths have been covered before by instruments on the telescope, they have never been covered with the same combination of sensitivity and faintness.

The Cosmic Origins Spectrograph

Spectroscopy is the science of breaking up light into different components, thus, determining an object's temperature, density, chemical composition, and velocity. Using this approach, the COS will provide the means for characterizing distant objects in space.

This new spectrograph is well equipped to observe faint point objects to detect their structure and composition, providing valuable information that has never been obtained.

"Our goal with the COS is to produce the most efficient spectrograph ever flown in space," explains Dave Leckrone, Senior Scientist for *Hubble* at Goddard. "It will do this by spreading out the light into its component colors and measuring the brightness of the light and how it changes the color. All kinds of interesting physical information comes from these kinds of observations."

Although the new spectrograph will not produce the dynamic pictures that *Hubble* is so well known for, it will still be a very fundamental tool for astrophysicists.

"The spectrograph's design is very clever in that it does everything it needs to do with light with one bounce, and with one mirror," said Leckrone. "A single bounce collects the light, spreads the light out into its component colors and spectrums, and brings it to a focus on an electronic spectrum."

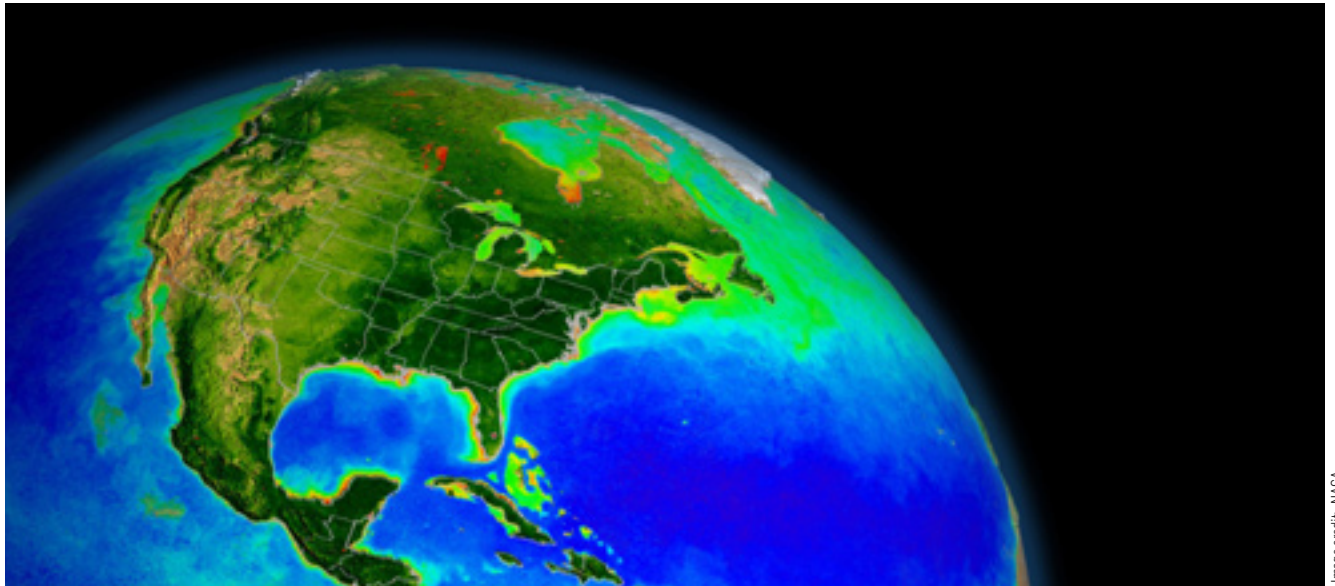
Should astronauts successfully repair the Space Telescope Imaging Spectrograph aboard *Hubble*, it will complement observations made by the new COS.

COS will take the place of the Corrective Optics Space Telescope Axial Replacement (COSTAR), astronauts installed during Servicing Mission 1, to correct a flaw in *Hubble's* primary mirror.

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SeaWiFS Charts the New Frontier of Ocean Science: An Interview with Gene Carl Feldman

By Maria Frostic



Caption: The remarkable image of the Earth's biological activity on land and in the ocean was captured by SeaWiFS and depicts ocean chlorophyll concentrations and land vegetation indices produced from all data acquired between September 1997 and August 2007.

On September 19, a panel of renowned ocean scientists gathered in the Goddard Science TV Studio for a live press conference highlighting the successful first decade of the Sea-viewing Wide Field-of-view Sensor (SeaWiFS).

Launched on August 1, 1997, SeaWiFS was designed to measure ocean color from space and after a decade of nearly flawless performance, it has earned the reputation of perhaps the best calibrated, most comprehensive biological data set ever collected about the Earth's biological response to environmental change. In this interview, SeaWiFS Project Manager Gene Carl Feldman reveals some of what the instrument has taught us in 10 years, and discusses how it is changing the way we study life on this planet.

Why study the ocean from space?

When I talk to kids, the first question they always ask is, "Why do you study the ocean from space? Wouldn't it just be better to go out in a boat or to put on a scuba tank and go diving?" Yes, that's great if you want to study individual creatures or how things work in detail. But, if you want to understand how the ocean works as a *whole*, you need to take a giant step back. And that giant step, in this case, is up into space.

As opposed to a forest or field, it's very hard to study the oceans—for a number of reasons—and there is really no way that you can fully characterize the variability that we see in the ocean from the deck of a ship.

The ocean is just too big and it changes too quickly, which is where satellites can play such an important role. For example, in 1 minute SeaWiFS can collect the same number of observations of the ocean that would take a ship 10 years to make.

How does SeaWiFS work?

SeaWiFS is essentially a big light meter in space; it measures the amount of light reflected from the Earth and ocean, which reaches the spacecraft in eight different wavelength bands. Because phytoplankton—those microscopic plants that live in the surface layers of the ocean—contain the green pigment called chlorophyll, the more phytoplankton we have in the water, the greener it is; and the less phytoplankton, the bluer the water. Essentially, we use SeaWiFS to measure how blue or how green the ocean is and from that, determine how much phytoplankton there is in the water.

Why should we care about phytoplankton? It's safe to say, with just a few exceptions, that all life in the ocean ultimately depends on phytoplankton for its nutrition, and if it weren't for phytoplankton, the Earth as we know it would probably not exist. The oceans play the most significant role in the global carbon cycle, which includes carbon dioxide in the atmosphere. Over geologic time, approximately 99.9% of all the carbon that's ever been taken up by plants is found in the ocean and in marine sediment. We need to understand how the ocean's ability to take up carbon changes in time and space and the role that phytoplankton play in that process because that is key to understanding what might happen in the future.

What has 10 years of observing ocean color allowed you to see?

The beauty of studying the oceans from space is the consistent way that satellites allow us to observe things on many different time and space scales.

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SeaWiFS Charts the New Frontier of Ocean Science

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One can study very short term, small-scale features, such as upwelling events, red tides, and effects of passing storms, but you can also look at long-term changes in the ocean over very broad regions, even globally.

When SeaWiFS was first launched in late 1997, we were in the middle of a major El Niño event that, among other things, resulted in a dramatic decrease in ocean productivity across the entire equatorial Pacific Ocean. In the spring of 1998, the El Niño event ended and we entered the La Niña period. This transition, as witnessed by SeaWiFS, resulted in the largest plankton bloom ever observed, stretching from the coast of South America westward past the dateline—an imaginary line through the Pacific Ocean roughly corresponding to 180° longitude, to the east of which, by international agreement, the calendar date is one day earlier than to the west. Amazingly, this transition from what was essentially a desert to a rainforest took place over the course of just a few weeks.

Who is using SeaWiFS data?

From the very beginning, we wanted to make sure that the SeaWiFS data of the highest quality would be available to as many people around the world as easily as possible, and that they would have the tools they needed to work with the data. Today, students, teachers, policy makers, researchers, and the general public, through the use of the Web, have access to these data sets and can download them to their desktops, generally within hours of observation by the spacecraft. It's really been a revolution in the way we carry out our science, and in this particular case, the way oceanography is being done. Through the advent of satellites, the furthest reaches of the ocean are now accessible to everyone.

How do you envision the future role of SeaWiFS?

There's every indication that unless something catastrophic happens on the spacecraft or to the instrument, SeaWiFS should be able to last for quite a while longer. The fact that we have a decade-long record of such a key environmental parameter from a single instrument is just phenomenal. We've been able to detect trends over this decade that would not have been detectable any other way, and we've been able to correlate [those trends] with changes in the physical condition of the ocean that were observed to have taken place over the same period of time.

Although we are learning a great deal from these observations today, my feeling is that we're really taking these measurements for our children, and our children's children, who will be able to look back on this data set and understand how the Earth responded biologically to the incredible changes that we're seeing in the environment. Hopefully, they'll have the additional insight and data sets that will help them better understand and protect this place we call home. ■

NASA Solicitation and Proposal Integrated Review and Evaluation System (NSPIRES)

Supporting research in science and technology is an important part of NASA's overall mission. NASA solicits this research through the release of various research announcements in a wide range of science and technology disciplines. NASA uses a peer-review process to evaluate and select research proposals submitted in response to these research announcements. Researchers can help NASA achieve national research objectives by submitting research proposals and conducting awarded research. This site facilitates the search for NASA research opportunities.

For more information, please visit <https://nspires.nasaprs.com>

Solicitations:

Education and Public Outreach Division Support Groups

Released: 2007-09-04

Proposal Due: 2007-12-07

NASA ARMD Research Opportunities in Aeronautics (ROA) NRA

Released: 2007-06-12

Proposal Due: See Announcement

Research and Technology Development to Support Crew Health and Performance in Space Exploration Missions

Released: 2007-08-10

Proposal Due: 2007-12-14

Research Opportunities in Space and Earth Sciences (ROSES)—2007

Released: 2007-02-16

Proposal Due: See Announcement

Research Opportunities in Space and Earth Sciences—2005

Released: 2005-01-27

Proposal Due: 2008-12-15

Small Explorer (SMEX) and Missions of Opportunity

Released: 2007-09-28

Proposal Due: 2008-01-15

The Landsat Data Continuity Mission: Extending the Longest Legacy of Global Land Observation

By Laura Rocchio

In a world filled with geospatial information, only Landsat offers a rich archive of global mid-resolution, highly calibrated, multispectral data of Earth's landmasses. To extend this legacy, plans are in the works for a July 2011 launch of the Landsat Data Continuity Mission (LDCM), which will collect and archive data consistent with its predecessor Landsat satellites. This July, NASA selected Ball Aerospace and Technology Corporation to build LDCM's Operational Land Imager (OLI) instrument, bringing the long-awaited Landsat follow-on mission closer.

A Long Road to Launch

Efforts to implement the LDCM have been ongoing since the launch of Landsat 7 in 1999. After eight years and three different implementation tactics, NASA released the official solicitation for the procurement of the LDCM imaging radiometer on January 9, 2007. Industry proposals were submitted by February 23, 2007, and Ball Aerospace was selected on July 16, 2007.

Procurement activities for the LDCM spacecraft are ongoing and NASA will likewise be procuring the Mission Operations Element (MOE) portion of the ground system for the U.S. Geological Survey (USGS). The MOE will consist of the Command and Control System, Mission Scheduling, Flight Dynamics, and data Long-Term Trending and Analysis system.

USGS will procure all LDCM ground segment resources necessary for comprehensive and timely global data acquisition. To minimize any data gap, the LDCM project must maintain the technical integrity of the mission and strive to meet an aggressive development schedule.

A Potential Data Gap

The detailed multispectral data provided by Landsat satellites have chronicled changes to Earth's landmasses for more than 35-years. However, as the promising future of LDCM approaches, the possibility of a Landsat data gap looms large.

Landsat Applications

As the first U.S. satellites designed for observing land surfaces, the Landsat imaging radiometers have provided the longest continuous record of Earth's surface as seen from space. Landsat gave the world the first unabridged perspective of human-induced large-scale environmental changes such as the rapid expansion of desert cities like Dubai and Las Vegas, the deforestation of the Amazon rainforest, and the disappearance of the Aral Sea.

Landsat-related research has led to the implementation of many socially beneficial applications, such as improved water management techniques, crop insurance fraud reduction, natural disaster relief planning, continental-scale carbon estimates, and extensive cartographic advances.

Data Use

Because of Landsat's long history and unparalleled data record, data continuity with prior Landsat missions is paramount. "The LDCM mission is charged with collecting data sufficiently consistent with data from early Landsat satellites to allow comparisons for regional and global change detection," explains NASA LDCM Project Scientist Jim Irons. "Although other satellite systems acquire similar data, the LDCM is being designed and developed specifically to enable multidecadal studies of global land cover and land use change using the historic Landsat data record."

What's New?

Although there are no plans for a thermal instrument on LDCM—unlike Landsats 4, 5, and 7—the satellite will include evolutionary advances in technology and performance. LDCM will have two new spectral bands, one tailored especially for detecting cirrus clouds and the other for coastal zone observation.

Additionally, LDCM will be required to return 400 scenes per day to the USGS data archive (150 more than Landsat 7), increasing the probability of capturing cloud-free scenes for the global landmass.

"The LDCM will continue to improve upon the Landsat 7 strategy of capturing seasonal coverage of the global land surface into a single archive affording access to the general public," says Irons. "No other satellite system affords even annual global coverage of the land surface at the landscape scale where changes to land use can be observed and characterized."

Ground Segment

The LDCM data archive will be operated and maintained by USGS. "For LDCM to further advance our global observing capabilities, innovative strategies for significantly increasing the number of daily global acquisitions, improving access to LDCM data, and providing those data in a Geographic Information System (GIS)-ready format to users at the lowest possible cost are driving the design," explains USGS Landsat Science Team Chair, Tom Loveland. "This should significantly increase large-area operational land-monitoring applications, including studies of land change, vegetation condition, and disaster assessments."

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Ready, Set, Pledge: NASA Gears Up for Another Year of Charitable Giving

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2007 Goddard CFC Steering Committee

Jonathan Root	Campaign Manager	Jonathan.Root@nasa.gov	6-0077
Kelly Farrell	Codes 100, 101, 120, 130, and 140	Kelly.J.Farrell@nasa.gov	6-5282
Cathy Waltersdorff	Code 110	Catherine.A.Waltersdorff@nasa.gov	6-5025
Joseph Poist	Code 150	Joseph.N.Poist@nasa.gov	6-8938
Amanda Heslep	Code 200	Amanda.J.Heslep@nasa.gov	6-5091
Daniel Simpson	Code 200	Daniel.S.Simpson@nasa.gov	6-0280
Donna Lynch	Code 300	Donna.L.Lynch@nasa.gov	6-6086
Linda Dyson	Code 400	Linda.M.Dyson@nasa.gov	6-7003
Katy Mikkelsen	Code 400	Catherine.S.Mikkelsen@nasa.gov	6-4412
Barbara Milner	Code 500	Barbara.C.Milner@nasa.gov	6-6355
Harvey Walden	Code 500	Harvey.Walden@nasa.gov	6-9140
Marjorie Ott	Code 600	Marjorie.A.Ott@nasa.gov	6-6066
Carol Krueger	Code 600	Carol.A.Krueger@nasa.gov	6-8811
Karen Harding	Code 700	Karen.F.Harding@nasa.gov	6-8745

New Science Instruments for *Hubble*

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Goddard's Role

"Some people may not know that the *Hubble* project at Goddard is responsible for *all* things *Hubble*," Leckrone remarked. "There is not anything regarding the telescope that we are not responsible for in some way and that includes the design and development of the instruments. From A to Z... we play a key part."

To ensure mission success, all mission hardware goes through rigorous ground testing prior to launch and the Wide Field Camera 3 and Cosmic Origins Spectrograph are no exception.

Goddard engineers put all components and instruments through a series of simulations that replicate gravitational forces experienced (known as G-forces), noise and vibrations during launch, and the extreme hot and cold spells in space to assess how they perform. Any issues are caught ahead of time and fixed, so the team can be confident that everything the astronauts will be installing on *Hubble* will withstand its trip to space and meet its mission life expectancy. ■

The Landsat Data Continuity Mission

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LDCM Project Partners

LDCM is made possible by a partnership between NASA and USGS that builds upon a strong relationship developed during previous Landsat missions. NASA brings its Earth observation innovations and space segment expertise to the table, and USGS provides experience and expertise in managing ground systems.

Mission Success

"We believe the success of the mission depends on LDCM integration with past, present, and future Landsat and other Earth observation data," Loveland explains.

Successful integration hinges on accurate calibration. Coordinated calibration efforts of USGS and NASA will again be part of the LDCM calibration strategy. "Calibration and characterization of Landsat 7 has set a standard for other passive optical systems," says Irons. ■

Work Progresses on Goddard's Exploration Sciences Building

By Rob Gutro and Rob Garner



Caption: This artist's rendering depicts how NASA Goddard's new Exploration Sciences Building will look when completed.

Just a little more than two months have passed since the July 16 groundbreaking ceremony for NASA Goddard's new Exploration Sciences Building (ESB), Project Manager David Larsen says work is right on schedule.

Upon its completion, scheduled for 2009, the new building will house personnel from the Astrophysics Science Division, the Solar Systems Exploration Division, and the Directorate office. ESB will serve as the "launching pad" for NASA-driven space science research over the next 50 years.

Right now, the contractor, Manhattan Construction Company, is preparing the site for both the building and the underground utilities. The primary focus has been to install the sediment and erosion control devices, including the construction of a new sediment pond at the northeast corner of the site. Once completed, the face of the construction site will really begin to change as the building emerges from the ground during the autumn timeframe.

Once completed the building will become NASA's largest "green" (environmentally friendly) building. EwingCole, the architecture and engineering firm that designed the building, has integrated sustainable design initiatives on sustainable sites, water efficiency, energy efficiency, materials selection, and indoor environmental quality.

A focus on the use of sustainable materials, a reduction in both water and energy consumption, and an improvement in the indoor environmental quality of the building are only a few of the features that will help the building attain a Leadership in Energy and Environmental Design (LEED) Silver Certification. The (LEED) rating system is a voluntary certification program that certifies high-performance eco-friendly buildings.

The silver rating signifies a high level of commitment to designing, procuring, and installing environmentally friendly materials and incorporating sustainable practices in both design and construction. The U.S. Green Building Council developed the LEED system in 1998 to promote eco-friendly construction.

"NASA's new eco-friendly science building will provide state-of-the-art laboratories and technology for our scientists, giving them access to modern tools and facilities for continued world class research in space and Earth science, and in support of NASA's mission," said Center Director Dr. Edward Weiler at the groundbreaking ceremony. ■

Help Wanted: NASA is Looking for Astronauts

Brought to you from OHCM

[Help Wanted: Seeking intelligent, capable engineers, scientists, educators, and pilots willing to sleep in their office in exchange for a great view.](#)

NASA's looking for candidates for its 20th astronaut class. In the past 48 years, NASA has hired 321 astronauts, but this group will have the distinction of being the first class since 1978 to be selected for something other than shuttle flight. Because the selection period won't end until 2009, and because it takes about two years to train to become an astronaut, this new class won't be ready to fly until 2011—a year after the Space Shuttle program is scheduled to be retired.

Still, the astronaut program thinks it can make applicants an appealing offer: the chance to spend three to six months orbiting the Earth from 200 miles up, in the *International Space Station* (ISS).

"The long-duration flights are strenuous and more tedious, and training time is longer," said Duane Ross, Astronaut Candidate Selection and Training Manager. "But can you imagine being in space for three to six months? It's awesome."

"Awesome" pretty much describes most of the astronaut experience, according to those who have been there and done that. The training is difficult, they say, and the hours sometimes long. But the payoff is worth it, if a little on the surreal side.

"I never thought I'd do a spacewalk," said Danny Olivas, a mission specialist who made a trip to the Space Station in June. "I never thought I'd be hanging around a bunch of guys who'd been in space before. I never thought I'd be working with Moon rock scientists or a bunch of engineers who design space tools. And then when you think about what it all does and where it all goes, and what it all means—that is the best part."

The Space Station is the largest international scientific and technological endeavor ever undertaken. It's a permanent laboratory in a realm where temperature, pressure, even gravity can be manipulated in ways impossible on the ground, making it the perfect test bed for the technologies of the future and the best place to learn about living in space—not to mention an exciting place to work.

"We're up there, using the Space Station to figure out how to go other places in the universe," said Suni Williams, a station flight engineer who recently broke the record for longest spaceflight by a woman after spending 195 days in space. "I think it's something we need to do as we're getting more and more people on this Earth. How to work in a low-gravity environment and how to work in an environment that is not habitable for us—that will take us to the next place."

And speaking of the next place, astronauts selected for the class of 2009 are going to start right in the middle of preparations for NASA's next big adventure.

"What we're doing right now is planning for Constellation, Orion, Ares—going back to the Moon," Ross said. "I was here when we went to the Moon the last time, and that's really exciting stuff. This class that we select will be here during all that preparation time, all the planning. There will be some really interesting things for them to do and be involved in." And eventually, when all those preparations come to fruition, members of this class could be among the ones to see them through.

A future full of moonwalks may be a little hard to imagine, but Leland Melvin, who will be taking his first flight into space later this year, would tell you that it's worth giving it a try. As a chemist, he never planned to become an astronaut or even considered trying until a friend of his joined the program.

"I applied and came down to Houston for an interview," he said. "And it was all these people, these top-gun military pilots and triple Ph.D.s, and I thought, 'Wow.' I went through the whole process not thinking that I'd get in, just kind of a whim thing. And then I got a phone call—'Hey Leland, we want you to come down.'"

To be eligible to apply, you need to be a United States citizen with a bachelor's degree in engineering, biological science, physical science, or mathematics and either 1,000 hours of pilot-in-command time, or three years of experience in your field, or as a teacher. Advance degrees can be substituted for experience, however—a master's degree counts for one year of experience, and a doctorate counts for three. There are health requirements you must meet as well.

The astronaut selection board will narrow the pool down based on their applications, and then invite finalists down for a week of medical screenings, personal interviews, and orientation. At that point, Ross said, if you meet all the medical requirements, the board will be looking for people with a good technical background who are hands-on, practical operators—and who are nice people.

"And if you aren't selected for the 2009 class, that doesn't mean you should give up. Clay Anderson, who's been living on the Space Station since June, applied for every astronaut class between 1981 and 1998 before he was finally chosen. "Mentally it was hard to get that little card that said, 'Thanks, we got your application, but we didn't select you,'" he said. "I wish I would have saved all those cards, but as far as I'm concerned, it's been worth the wait."

Applications are due by July 1, and can be submitted at www.usajobs.gov. More information on the qualifications and job responsibilities can be found at www.nasa.gov/astronauts/recruit.html. ■

NASA's Participation in the NFB Youth Slam Encourages Blind Students in Careers

By Nancy Maynard and Rob Gutro



Caption: NASA's Nancy Maynard and a student examine an astronaut suit.

Career paths and opportunities for blind students were the focus of the NASA activities at the NFB "Youth Slam" event in August.

Youth Slam is a four-day academy designed to engage and inspire the next generation of blind youth at the high school level, to consider careers falsely believed to be impossible for the blind.

On August 1, 2007, NASA provided excitement and information about NASA science, technology, engineering, and mathematics (STEM) education and career paths to almost 200 blind youths and their mentors as part of the National Federation of the Blind's "Youth Slam" event.

The Youth Slam, the largest gathering of blind high school students ever assembled, was also designed to increase positive student attitudes about blindness. The NASA team helped the students increase their understanding of education and career possibilities, as well as some of NASA's activities through models of the surface of Mars as explored by the Rover, "Spirit," Moon craters, and constellations, as well as tactile contact with a full astronaut suit, helmet and gloves, and—the ever popular—astronaut food.

The Public Affairs Office photo booth was a big hit with students and mentors. Manning the booth from NASA Goddard were Nancy Maynard, Jane Nall, Sonya Lawrence and her husband (a volunteer), and Michael Hartman. "Enthusiasm for all of NASA's activities was palpable as many students expressed great interest in science careers—and were especially excited about the possibility of working at NASA," said Nancy Maynard.

Dr. Leonard Garcia, and Mr. Jay Friedlander of Code 672 and Dr. Jim Thieman of Code 690.1 presented their Solar System Radio Explorer Kiosk. This interactive display is designed to teach students about the planets and the electromagnetic spectrum. The kiosk is covered in graphics as well as Braille and tactile raised relief images of the planets.

The unit also presents actual sounds of radio emissions from the Sun, Earth, and Jupiter and has vocal descriptions of the science behind these radio emissions.

"This was a wonderful opportunity to test this unit with dozens of eager high school students participating in the 'Youth Slam,'" Garcia said. "They were all very encouraging." This project builds upon two successful NASA Goddard education programs, Radio Jove and the Interdisciplinary National Science Project Incorporating Research and Education Experience (INSPIRE). The kiosk was developed in cooperation with Noreen Grice of You Can Do Astronomy, LLC and Touch Graphics, Inc. ■

For more information about Youth Slam, please visit: http://www.blindscience.org/ncbys/Youth_Slam.asp



Caption: Len Garcia with students at the National Federation of the Blind's "Youth Slam" event.

Husband Uses NASA Tools to Aid Researchers in Wife's Cancer Treatment

By Alana Little

Dr. Mark Schoeberl is an atmospheric scientist who specializes in stratospheric processes including wave dynamics, ozone depletion, and trace gas transport. He is currently the Chief Scientist for the Earth Sciences Directorate and the Aura Project Scientist with Code 610. Dr. Schoeberl has worked at Goddard studying Earth's atmosphere since 1983. Little did he know that his talents were being honed for what some would be considered an even greater use—cancer research.

Some people deal with their spouses fight with cancer by being emotionally supportive and going to doctor's appointments, holding their spouse's hand, and holding back thoughts of the worse case scenario. Others arm themselves with information, immersing themselves in research and getting second opinions. Barbara Schoeberl is blessed in that her husband Mark was able to do all of the above, and then use his talents as a scientist and analyst to further cancer treatment research, helping not just his own wife, but cancer sufferers everywhere.

Barbara has worked for Goddard in several positions. Her first position was as contractor manager in the Scientific Visualization Studio, then as the manager for the Visualization Analysis Laboratory, and she has also worked for the Tropical Rainfall Measuring Mission (TRMM) and Aura projects generating outreach products. Her latest effort is an exhibit called "Earth Today" which can be seen in the Bldg. 33 lobby. Mark and Barbara work together daily as a married couple and have worked together at Goddard in the Earth Science Division in the past, so working together as a team to defeat her cancer was nothing new to this dynamic couple.

Barbara became ill and began withdrawing from more and more work activities and other responsibilities as her health began to decline, yet her disease went undiagnosed. By the time the cancer was diagnosed, it had reached a very advanced stage requiring major surgery and 12 weeks of intense chemotherapy. "Managing the side effects of the weekly chemo treatments became my full time job," she said.

Chemotherapy is the general term for any treatment involving the use of chemical agents to stop cancer cells from growing. It's a popular treatment for many forms of cancer because it can destroy cancer cells in places other than where the original cancer started. It's the "Delta Force" of cancer treatments and many times it is the only weapon against the cancerous cells that have moved outside the primary tumor. But "chemo," as many people call it, is brutal on the body with side effects that can be permanent.

It was this very issue that Dr. Schoeberl decided to tackle when his wife of 9 years, Barbara, was diagnosed with a very rare form of cancer called gestational trophoblastic neoplasia (GTN).

With chemotherapy, it's difficult to tell exactly how much treatment is needed to kill the cancer. The side effects associated with chemo get worse as treatment continues. For example, a patient could receive chemo for several weeks, after which her doctor would test for certain cancer markers in the blood. If the markers were still elevated, then the doctor would recommend that the patient would need further treatment. If the markers were lower, then the patient could be assured that the treatment is going as it should. The problem is that some of the markers that doctors are looking for remain in the blood stream even after the patient has received enough chemo to kill their cancer. So, how do doctors know when it's safe to stop chemo treatment?

A shorter chemo regime would significantly reduce the onslaught on the body and help keep the patient healthier. Not only will a healthier patient recover more quickly from treatment, but their morale is much higher. Finding a better way to judge whether chemo is working is the basis of Dr. Schoeberl's research.

His background in fluid dynamics and work with data analysis techniques used in looking at NASA satellite measurements enabled him to develop a model for the changing concentration of cancer markers in the blood stream. "Barbara was keeping careful records of her cancer marker, β -HCG, and I saw the behavior of fluid dilution in the data," he explained.

His study developed a way to model the behavior of the tumor marker human chorionic gonadotropin (β -hCG), a peptide hormone normally produced in pregnancy. Early pregnancy testing is generally based on the detection or measurement of hCG present in a woman's body. Because hCG is produced also by some kinds of tumors, in this case the aggressive GTN tumor that Barbara had, hCG is an important tumor marker.

Dr. Schoeberl's research shows that hCG levels are very sensitive to small changes in tumor size and the tumor's response to chemotherapy. Monitoring hCG levels during chemo has produced a reduction in cases of rare cancers, like GTD, in women of childbearing age. As doctors learn more about different types of cancer and their respective markers, they've learned that changes in hCG levels can serve as a model for interpretation in other markers after tumors have been removed. Usually, once a tumor is removed, the hCG levels drop significantly and then drop further during chemo. In aggressive cancer, hCG levels do not drop off and can sometimes even go up. Dr. Schoeberl's research shows that interpreting the fall off of hCG is useful in predicting how well a patient is recovering from the treatment or whether more chemotherapy will be needed.

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Employee Spotlight: Detective Robert Young

By Regina Martin



Robert "Bobby" Young of the Security Division, Code 240, knew he wanted to be in law enforcement ever since he was 11 years old and saw the street patrolman in his Baltimore neighborhood walking his beat. "I watched him protect the neighborhood and it sparked my interest in law enforcement," Detective Young said.

Photo credit: Pat Izzo

Caption: Detective Robert Young.

"My approach to law enforcement is to treat everyone like I would want to be treated," says Young. "Whether I am dealing with a thief or a good guy, I treat people like human beings," he explains.

Young has been in the field for 20 years and brings significant experience to his position as an investigator in the Security Division of Goddard. As a retired detective with the Prince George's County Police Department and a former fraud investigator with the area's largest bank, Young has been schooled in the art of investigation and uses those skills to solve cases on Center. Young ensures that Goddard employees and Government property are protected. The majority of his responsibility is to investigate theft of Government and personal property. He also does short term investigations of crimes on Center. Young works with the Office of the Inspector General to investigate cases involving Government property.

One of the detective's approaches to his job is to conduct surveillance. He patrols buildings on Center to make sure that both Government and personal property are secure. He stresses to employees that they should protect their belongings. Young tries to educate employees about their security and explains that just because you go through the front gate and show your badge doesn't mean you still shouldn't be careful. He recently investigated multiple thefts of laptop computers and the theft of a personal digital assistant (PDA), which was left on a desk and had the owner's "whole life" inside.

The most challenging part of his job is trying to communicate to Goddard employees about their shared responsibility to protect NASA property and personal property. According to him, theft is a crime of opportunity and although we work in a secure facility, employees must take basic precautions such as locking their vehicle's doors, not leaving valuables in plain view and taking the extra 30 seconds to secure your valuables in your desk. ■

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It takes time for the hCG to wash out of the body by fluid exchange. He hypothesized that when the tumor was active it was saturating the body tissues with hCG. Once the tumor was removed, hCG stored in the body's tissues diffused back into the blood stream and was passed out of the body. Using the data from his wife's blood tests, he found two time scales for the elimination of hCG, a fast time scale in which hCG is released from the body quickly, and a slower time scale where deep tissue reservoirs give up hCG more reluctantly.

Remembering that elevated levels of hCG in the body could signal the need for further treatment, a condition called persistent trophoblastic disease (PTD), Dr. Schoeberl's dilution model can show if cancer colonies remained after surgery. A better understanding of how hCG levels can vary allows for early diagnosis of PTD. If hCG levels continue to fall after surgery and treatment according to his model, then the doctor can assure the patient that the treatment is following a normal course of recovery despite a slow decline of hCG levels.

"Doctors were already studying and plotting protein data markers in cancer research, but their analysis was not based on any physical model. I was able to create a physical model of what could possibly be going on and I was able to show that the model was consistent with the statistics from other studies," Dr. Schoeberl said.

Dr. Schoeberl's use of fluid dynamic-related data analysis is groundbreaking and his findings were recently published in the *Journal of Gynecologic Oncology*, Volume 105, Number 3 June 2007.

Barbara's cancer is gone and she has returned to working on Earth Science exhibits and on other things she loves to do, such as art and dance.

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