

National Aeronautics and Space Administration



# GoddardView

**Volume 5 Issue 7**

## **New NASA Administrator Visits Goddard**

Pg 3

**Goddard Space Flight Center: NASA's Vital Link  
to *Apollo 11***

Pg 7

**Sentinels of the Heliosphere**

Pg 8

[www.nasa.gov](http://www.nasa.gov)

## This Month in Goddard History

By Rob Garner

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

### Hubble Servicing Mission Preparations Continue

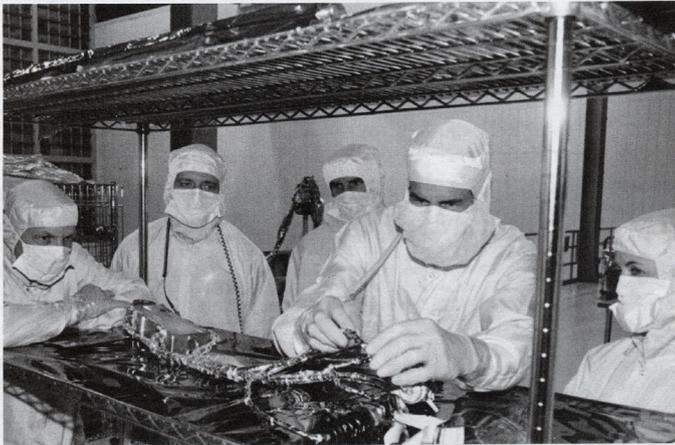


Photo by Ron Moore

STS-61 Crew Training

Preparations for the first servicing mission of NASA's Hubble Space Telescope (HST) continue this month with the departure from Goddard of the Wide Field/Planetary Camera-II (WF/PC-II) and the Corrective Optics Space Telescope Axial Replacement (COSTAR) for delivery to the Kennedy Space Center, Fla.

A significant milestone takes place in September when HST replacement components WF/PC-II and COSTAR are mated to their carriers. Astronauts will install these components on the 43-foot-(13 meter)-long,

14-foot-(4 meter) diameter HST during the mission.

Mission STS-61 is a planned 11-day flight featuring at least five spacewalks with seven crew members dedicated to servicing of the Hubble Space Telescope. Launch is currently targeted for early December.

Here STS-61 crew members (from left) Story Musgrave, Tom Akers, Greg Harbaugh and Kathy Thornton (far right) look on as Jeff Hoffman works on the Goddard High Resolution Spectrometer repair kit.

*Caption: Goddard has always played an important role in the success of the Hubble mission (from the August 1993 issue of "Goddard News").*

## GoddardView

Volume 5 Issue 7

### Table of Contents

#### Goddard Updates

- This Month in Goddard History – 2
- New NASA Administrator Visits Goddard – 3
- Goddard Celebrates the *Lunar Reconnaissance Orbiter* at Visitor Center Event – 4
- A Look Through the Lens of Space History – 5
- The Exploration Sciences Building's Cool Labs – 6
- Goddard Space Flight Center: NASA's Vital Link to *Apollo 11* – 7
- Sentinels of the Heliosphere – 8
- General Dynamics Receives NASA Honors for Work on *Fermi Gamma-ray Space Telescope* – 9

#### Goddard Family

- Making Sense of Space—A Sculptor's Journey – 10
- Thinking Snow—Goddard Glaciologist Likes it Cold – 11

#### Employee Spotlight

- Dorothy Hall – 12

Cover caption: Recently appointed NASA Administrator, Charles Bolden, describes his vision for NASA.

Photo credit: Bill Hrybyk

### GoddardView Info

Goddard View is an official publication of the Goddard Space Flight Center. It is published bi-weekly by the Office of Public Affairs in the interest of Goddard employees, contractors, and retirees. A PDF version is available online at:

<http://www.nasa.gov/centers/goddard/news/index.html>

**Managing Editor:** Trusilla Steele

**Editor:** John Putman

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

## New NASA Administrator Visits Goddard

By John M. Putman

On July 29, 2009, newly appointed NASA Administrator Charlie Bolden visited the Greenbelt, Md. campus of Goddard Space Flight Center. Bolden began his duties as the twelfth NASA Administrator on July 17, 2009.

After a tour of the Greenbelt facility, employees packed Goddard's Building 8 Auditorium to hear Bolden speak about his plans for NASA. He spoke of the Center's 50-year legacy of exploration and the crucial role Goddard has played in "just about every NASA mission."

Bolden spoke of his meeting with President Obama, which included a brief discussion on the latest "Star Trek" movie. The event was broadcast to Wallops, Goddard's Independent Verification and Validation facility, and the Goddard Institute of Space Studies in New York via closed circuit NASA TV.



Photo credit: Pat Izzo

*Caption: NASA Administrator Charlie Bolden spoke of his meeting with President Obama, which included a brief discussion on the latest "Star Trek" movie. Here, Bolden salutes a crowd at Goddard's auditorium with the famed "Live Long and Prosper" hand gesture. Goddard Center Director Rob Strain is seated at the left.*



Photo credit: Pat Izzo

*Caption: Administrator Bolden shoots from the hip.*

After his remarks, Bolden answered questions from employees about community outreach and how to highlight NASA's role in everyday life. Bolden also addressed Goddard's diversity, pointing out how the Agency has changed since the *Apollo* missions.

This wasn't the Administrator's first visit to Goddard. Seventeen years ago to the day, then-Colonel Charles Bolden spoke at Goddard as a guest of the Black History Club in 1992.

Bolden's confirmation marks the beginning of his second stint with the Nation's Space Agency. His 34-year career with the Marine Corps included 14 years as a member of NASA's Astronaut Office. After joining the office in 1980, he traveled to orbit four times aboard the Space Shuttle between 1986 and 1994, commanding two of the missions. His flights included deployment of the *Hubble Space Telescope* and the first joint U.S.-Russian Shuttle mission, which featured a cosmonaut as a member of his crew. ■



Photo credit: Pat Izzo

*Caption: NASA Administrator Charlie Bolden addresses the Goddard community in the Building 8 auditorium.*

## Goddard Celebrates the *Lunar Reconnaissance Orbiter* at Visitor Center Event

By Brooke Hsu and Nancy Neal Jones

On Saturday, August 1, Goddard Space Flight Center hosted “We’re at the Moon,” an event to celebrate the historic return to the Moon with the *Lunar Reconnaissance Orbiter* (LRO). Approximately 700 guests attended the event.

Members of the LRO team were on hand to give a perspective of NASA’s lunar exploration from *Apollo* through LRO and beyond. The panel discussion was held in the Earth Science Gallery for a standing room only crowd. On hand to discuss everything from first images, laser ranging, LRO goals, and *Apollo*’s legacy were Richard Vondrak, LRO Project Scientist; Cathy Peddie, LRO Deputy Project Manager; Mark Beckman, LRO Flight Dynamics Lead; Ron Zellar, Laser Ranging Systems engineer; and Paul Lowman, Goddard geologist.



*Caption: Ron Zellar, Laser Ranging Systems engineer; Cathy Peddie, LRO Deputy Project Manager; Mark Beckman, LRO Flight Dynamics Lead; and Paul Lowman, Goddard Geologist discuss NASA’s history and future on the Moon.*

Guests could gaze at stars and the Moon through telescopes, talk with the LRO team, and see new images from the satellite, among other activities. Visitors also ventured to the Center’s laser ranging facility, where engineers track the LRO satellite. A number of hands-on activities for young children and their families provided knowledge and understanding of the phases of the Moon, crater creation, and the scale of the Earth–Moon system.

Children in attendance were given the opportunity to explore the relationship between Earth and the Moon, make impact craters, and investigate the phases of the Moon using golf balls on golf tees.

Cathy Peddie and Rich Vondrak celebrated the occasion with a cake cutting ceremony to honor LRO. As it got dark, amateur astronomers from Goddard and the Greenbelt Astronomy Club treated visitors to views of the Moon through telescopes of all different shapes and sizes.

The most popular activity of the evening was the bus tours to the Goddard Geophysical and Astronomical Observatory, where the LRO Laser Ranging facility is located. Guests were treated to a laser light show of astronomical proportions. Two lasers were operational and sent separate laser beams to LRO as it orbited the Moon.



*Caption: This photograph shows the Laser Ranging Facility at Goddard’s Geophysical and Astronomical Observatory, which helps NASA keep track of orbiting satellites. The lower of the two green beams is from the Lunar Reconnaissance Orbiter’s dedicated tracker. The other laser, although appearing to originate from above, originates from another ground system at the facility. Both beams are pointed at the Moon—specifically at LRO in orbit of the Moon.*

LRO, built and managed by Goddard Space Flight Center, launched on June 18, 2009. LRO will spend at least one year in low polar orbit around the Moon, collecting detailed information about the lunar surface. Among other aims, LRO’s objectives are to scout for safe future landing sites and locate potential resources.

To learn more about the laser ranging facility, visit: <http://lro.lrgsfc.nasa.gov>.  
To learn more about LRO, visit: <http://www.nasa.gov/lro>. ■

## A Look Through the Lens of Space History

By Adriana Diaz Dopazo

Forty years ago, millions witnessed the expansion of human knowledge about space through the live broadcast of the first steps on the lunar surface, something that was thought to be impossible. *Apollo 11* was the first manned mission to land on the Moon, but the third human voyage towards our nearest neighbor. It was launched on July 16, 1969 and landed on the Moon on July 20. America had fulfilled its goal of reaching the Moon.

The first steps would not have been seen at all if it wasn't for Stan Lebar, who served as Program Manager of the *Apollo* TV Lunar Camera. Stan was tasked to coordinate the worldwide television transmission for the television signals sent from *Apollo 11* to Earth. The signals were processed to satisfy the television broadcast formats and retransmitted to the worldwide audience.



Photo credit: Debora McCallum

*Caption: Stan Lebar stands in front of an image of himself from 1969. In the picture, Lebar is holding the camera (right) used to capture live footage of man's first steps on the Moon.*

"This was one of the most exciting things of my life," said Stan. "Moments before the first images appeared I was asked to be prepared to go on TV if it did not work and explain why it didn't. You could imagine how nervous I was until the first images came up and was relieved."

There were many questions as to where the camera was installed and how the images were captured. The camera was mounted upside down on the door next to the exit ladder. When the astronauts pulled the D ring, the door would open and the camera would turn right side up and start recording



Photo credit: Bill Ingalls

*Caption: Mike Simons, Director of the National Electronic Museum in Baltimore, Md. assembles an Apollo TV camera for display.*

instantly. The camera was equipped with a 100-foot long cable that made it possible for the astronauts to carry it around the landing site and look at the spacecraft.

The camera itself looks unremarkable. It was small and covered with material that could handle extreme temperatures. It resembled a metal box. Looks weren't important. The camera's job was all about showing the world those first steps on the lunar surface.

"We achieved our biggest goal and were able to show everyone a live broadcast of what was being discovered," said Stan. Stan pointed out that, at the time, NASA was not that interested in the television or what the camera might do. They were skeptical about the idea of having the world connected to one channel to watch this event and about the camera even working. Back then, this achievement was more of a political goal, but today, Stan says, "We should look at the possibility of going back for better reasons."

It is part of NASA's mission to inform the world about what is in space and to look for answers to those questions that seem impossible to answer. For more information about the 40th anniversary of *Apollo 11*, visit: [http://www.nasa.gov/mission\\_pages/apollo/40th/index.html](http://www.nasa.gov/mission_pages/apollo/40th/index.html). ■

## The Exploration Sciences Building's Cool Labs

By Rob Gutro

The laboratories in the new Exploration Sciences Building (ESB) hide all kinds of cool secrets. Putting the labs together took a lot of ingenuity because of the many different types of projects that NASA scientists will work on in those rooms.

Scientists working in labs must consider many environmental factors when working in a lab environment. That means a big job for the architect who designs them. Maryellen Ramsey is the architect at Goddard who developed ideas for the labs and worked with the architects at EwingCole, the firm in Philadelphia, Pa., and Washington, D.C., that designed the building.

The laboratory floors and walls required special attention, planning, and ingenuity. The laboratory floors are made from epoxy. There is no silicone or organic compounds used because of off-gassing. Off-gassing means that volatile chemicals in nonmetal materials evaporate into the air at normal atmospheric pressure. Building materials can release chemical gases and odors into the air as they evaporate, and that process can last for years after the products are installed. "The flooring products were all tested by Code 540 to ensure that off-gassing compounds would not affect optical instruments," said David Larsen, ESB Project Manager at Goddard. Silicone couldn't be used in the laboratories either, because it gets into optics of satellites.

Installation of the floors is an involved process. In fact, it's a three part process that involves a base coat, then a color coat, then a top coat of paint. Another floor feature in the laboratories prevents electrostatic discharge. That's important because static electricity could interfere with electrical equipment. To create a grounded lab floor, wires are laid under the top coat of paint, and they nullify the static charges.

In addition to the out-of-the-ordinary flooring, these new laboratories will also be flexible in their space if more room is needed. "The labs were based on a triple bay module, with two bulkheads demarcating the lab into thirds," said Ramsey. "Based on the use of the lab, an additional wall can be added at any one of those two bulkhead locations creating a single module lab and a double module lab instead of a triple module lab." Even when a room is sectioned into three rooms, each area will still have its own lab racks, lighting, and air ventilation.

Finally, the ESB has "black labs," and they're not Labrador Retrievers. Several laboratories have walls that have entirely been painted black. The black color will prevent light reflectivity problems when scientists are developing and testing optics. Ramsey said, "Six triples have the potential to become black labs. A "triple" is one lab that can be made into three, by using the dividers in the room. All six rooms have black epoxy floors and black casework.



*Caption: One of the ESB's "black labs."*

Photo credit: Debora McCallum

Casework means things such as wall cabinets, benches with countertops, and cabinets, tables, etc. While many of these six rooms are using lasers, only some of the current laser use requires there to be black walls. Should the type of laser activity in a given lab change, repainting the walls from white to black is a relatively quick and inexpensive expenditure."

The laboratories will move into the building in a phased manner starting in September of this year and continuing through the spring of 2010. In order for the labs to come together on schedule, all of the aforementioned casework needs to be installed and utilities like processed chilled water, compressed air, exhaust lines, and installation of non-standard electrical outlets (based on the needs for each lab) need to be completed.

Whenever you visit a lab in the Exploration Sciences Building, you'll now know some of the behind-the-scenes secrets that went into building its state-of-the-art laboratories. ■



*Caption: The Exploration Sciences Building electronics lab.*

Photo credit: Debora McCallum and Bill Hrybyk

## Goddard Space Flight Center: NASA's Vital Link to *Apollo 11*

By Rani Gran

Before there was the Internet, before faxes, and before *Tracking and Data Relay Satellites* (TDRS), NASA's Houston Mission Control relied on Goddard Space Flight Center for voice, television, telemetry, command, and tracking data for all of the *Apollo* missions.

"We were NASA's vital link," said Tom Janoski, retired Network Operations Manager during the *Apollo* missions. "We saw it before Houston, we heard it before Houston, and we made sure the data was good and valid before it went to Houston."

Several of Goddard's *Apollo* ground network support engineers and technicians gathered at the Ruby Tuesday's on Greenbelt Road on July 19, the eve of the 40<sup>th</sup> anniversary of the *Apollo 11* landing, to reminisce and reconnect about the work during the *Apollo* missions.



Photo credit: Rani Gran

*Caption: Front row: Al Fong, Joe St. John, Len Switalski, John Looser. Middle row: Tom Janoski, Bob Rodriguez, Chuck Duigan, Ed Lawless, Herb Cunningham. Back row: Riley Elwood, Elijah Alexander, John Harper, Warren Mitchell, Fred Herold.*

The *Apollo* ground network support was made up of hundreds of Goddard employees stationed all over the world. There were more than 17 ground stations, 6–8 aircraft, and 4 ships that helped keep *Apollo* spacecraft in constant communication with Houston. The *Apollo* spacecraft was out of communication for only 45 minutes of each lunar orbit, when the command module flew behind the Moon in each orbit.

Al Fong was a technician at the Guam Station from 1966–1989. It was the first ground station opened to support the *Apollo* missions. Fong says the most intense and exciting moment for him was *Apollo 8*, the first time astronauts went around the Moon. "We lost communication with them for a short time. It was intense waiting to hear from them again."

At the time of the *Apollo 11* landing, he could only hear Neil Armstrong's words. The only video display was on the other side of the building.

Warren Mitchell worked in the Manned Space Flight Network Communications Center (MSFNC) in the basement of Building 14. The MSFNC provided continuous operation of teletype communications between the operations center and the global network. "We were the Western Union of manned spaceflight," says Mitchell, then a teletype technician and now an engineer in Goddard's Flight Dynamics Facility supporting human spaceflight.

The Communication Center handled 100,000 messages and over a million distribution copies with an error rate of less than one percent, according to an April 12, 1971 *Goddard News* article. "Our supervisor did not tolerate mistakes," said Mitchell.

Located in what is now the Network Integration Center in Building 13, the MSFNC had a unique atmosphere—it was called "the cave." It was a very dark, black room that was always hot. One could occasionally hear the vacuum swoosh sound of the pneumatic mail system, similar to the ones used at drive-through teller windows at banks. Most of the workers in "the cave" smoked and drank a lot of coffee.



Photo credit: NASA

*Caption: This photo, taken from an April 12, 1971 issue of Goddard News, shows Odie Woodall (left) and Warren Mitchell at a ground communication console. From this console, the communications center had voice communications with the Network Support Team, the Manned Spacecraft Center at Houston, and all of the worldwide tracking stations. The Center also monitored all voice communications to and from the *Apollo* spacecraft.*

In voice communications, engineers had over 200 buttons that they could push to connect various conferences between Houston, astronauts, or other areas served by the ground network. Hit a wrong button and Houston couldn't communicate with anyone.

Mitchell tells a story of watching sweat drip off his friend, Herb Cunningham, ground control coordinator, during a countdown confidence test. Cunningham's job was to do a voice check on all the circuits with Houston.

During the slow times, technicians would make paper airplanes and try to sail them over a temporary wall. "When the wall was removed, there was a several-foot-high stack of paper airplanes."

It took an army of people at the NASA Communications Network and the Goddard real-time tracking system to keep everyone at NASA connected to the *Apollo* missions. "We were all on the same sheet of music," said Janoski. "I was fortunate to be one of the conductors. ■"

## Sentinels of the Heliosphere

By Lori Keeseey

Greg Shirah isn't holding his breath, but a new 20-minute visualization that he and his team created to show the dance of NASA's heliophysics satellites could be considered for an Academy Award nomination.

SIGGRAPH 2009, an international conference and exhibition on computer graphics and interactive techniques, will present "Sentinels of the Heliosphere" as one of the world's 135 most innovative and stimulating computer-generated animated films at its Computer Animation Festival in New Orleans.

The festival's "Best in Show" award qualifies the winner to be considered for nomination in the Academy of Motion Picture Arts and Sciences Best Animated Short Film category.

Though winning the Best in Show award would be nice, and an Oscar even better, Shirah is pragmatic. He's pleased that "Sentinels" made the cut in the first place, especially considering the caliber of films submitted for inclusion in the festival. "Most of the movers and shakers in the computer graphics industry are there," Shirah said, referring to the bevy of animators, including Hollywood types, who attend the event each year.



*Caption: The team behind "Sentinels of the Heliosphere." Left to right: Tom Bridgman, Ernie Wright, Greg Shirah, Horace Mitchell.*

Making the recognition even sweeter, Shirah will be presenting at the show the techniques that Goddard's Scientific Visualization Studio (SVS) used to create "Sentinels," which tours the regions of near-Earth orbit, Earth's magnetosphere, the expanse between Earth and the Sun, and out beyond Pluto where *Voyager 1* and *2* are exploring the boundary between the Sun and the rest of the Milky Way.

This isn't the first time SVS has presented a film at SIGGRAPH. The studio, which works closely with scientists to create products that promote a greater understanding of Earth and space science, also will present a stereoscopic version of its "Safe Landing Sites" animation at this year's event. In addition, Helen-Nicole Kostis, another SVS staff member, plans to give a talk on stereoscopic visualization.

Shirah concedes that there's a lot of data in "Sentinels," including the orbits of 25 spacecraft, 8 planets, Pluto, and the Moon. "What we wanted to show was how many satellites we have out there, how big the Sun's influence really is, and how NASA's trying to study these gigantic structures."

Shirah believes the film achieves those objectives, and does this without compromising scientific accuracy. Most everything—including the position of the background stars as Earth makes its journey around the Sun and the relative size of its protective magnetic shield—is accurate. As the camera zooms in for a close-up of Earth, viewers can even see moving clouds and the line that separates day and night as the planet rotates on its axis. "What isn't accurate, of course, is the size of the Moon, the planets, and the spacecraft," Shirah said. "We had to scale them so that they could be seen."

Also accurate is how the team depicted the satellites' varying orbits, including the paths of two spacecraft that make up NASA's *Solar Terrestrial Relations Observatory*. When the Agency launched the spacecraft in 2006, they initially flew in a tight, highly elliptical orbit around Earth. As the film shows, the two started pulling away from one another after performing a "bank shot" off the Moon. While one continued traveling away from the Earth-Moon system towards its final orbit, the other intercepted the Moon's orbit a second time to execute a rollercoaster-like maneuver that then propelled it farther out into space.

As the film points out, sometimes travel isn't the goal. To achieve a certain scientific objective, the satellite needs to "park" near one of the so-called Lagrange points—where the gravitational pull of two objects balances one another. NASA's *Solar Heliospheric Observatory* is one such spacecraft. Parked in a halo orbit along Lagrange Point 1, the animation shows the observatory's location between the Sun and Earth and its unobstructed view that allows it to study solar activity in unprecedented detail.

The film even shows the far-flung orbits of *Voyager 1* and *2*, which are now investigating a vast region at the edge of our solar system where solar wind runs up against the thin gas between stars.

"We're really pleased with the results," Shirah said. "We've never shown the dance of heliophysics spacecraft like this before. What we hope is that people will look at this and appreciate the sheer number of satellites patrolling the heliosphere and the amazingly complex paths they take to carry out their jobs."

But he concedes he isn't quite finished with the project. He wants to add an animated overlay showing a coronal mass ejection, a balloon-shaped burst of solar wind that sweeps over Earth a few days after it explodes from the Sun's corona, frequently resulting in strong geomagnetic storms, auroras, and electrical power blackouts. "Sentinels' is a great first step," he said.

To see the film online, visit: <http://svs.gsfc.nasa.gov/goto?3595>. ■

# General Dynamics Receives NASA Honors for Work on *Fermi* Gamma-ray Space Telescope

By Rob Gutro

The *Fermi* Gamma-ray Space Telescope has been in orbit since June 2008 and has already been providing the scientific community with new information and findings on the high-energy universe. Recently, Goddard presented General Dynamics Advanced Information Systems (GDAIS) with two prestigious honors for their work on *Fermi*.

The GDAIS Integrated Space Systems (ISS) team, located out of Gilbert, Ariz., was recognized by NASA for its outstanding contributions to the development and activation of the *Fermi* Gamma-Ray Space Telescope, formerly known as the *Gamma-Ray Large Area Space Telescope* (GLAST).

*Fermi* is a powerful space observatory that will open a wide window on the universe. Gamma rays are the highest-energy form of light, and the gamma-ray sky is spectacularly different from the one we perceive with our own eyes. With a huge leap in all key capabilities, *Fermi* data are already enabling scientists to answer persistent questions across a broad range of topics, including supermassive black-hole systems, pulsars, the origin of cosmic rays, and searches for signals of new physics.

"General Dynamics was a large and critical part of *Fermi*'s success. They provided the spacecraft bus and integrated the Large Area Telescope into it," said Julie McEnery, *Fermi* Project Scientist at Goddard. "They also provided testing, mechanical integration, command, data, and power interfaces between the instrument and the spacecraft."

Goddard Center Director Rob Strain presented the ISS team with a NASA Public Service Group Achievement Award. It was accepted by Daren Iverson, the former *Fermi* Program Manager at GDAIS. The Exceptional Public Service Medal, the second highest award presented by NASA to a contractor, was awarded to GDAIS' Robb Pinkerton, the former *Fermi* Technical Program Manager. The individual recognition of Pinkerton was for his outstanding contributions to the development, integration, testing, and on-orbit activation of the *Fermi* observatory.

Since its launch in June 2008, *Fermi* has continuously mapped and provided data on gamma-ray sources in the universe. It has spotted the brightest ever gamma-ray burst and created an unprecedented clear view of the gamma-ray sky. From contract award to launch, the program spanned six years. During that time, more than 600 GDAIS employees worked on some part of the project. Building and testing of the satellite started in Gilbert, Ariz., and was completed at the U.S. Naval Research Laboratory, Washington, D.C., and at Kennedy Space Center, Cape Canaveral, Fla., where preparations continued through launch time.

The *Fermi* mission is an astrophysics and particle physics partnership developed by NASA in collaboration with the U.S. Department of Energy, along with important contributions from academic institutions and partners in France, Germany, Italy, Japan, Sweden, and the United States.

For more information about the exciting discoveries *Fermi* is making, visit the *Fermi* Web site at: <http://www.nasa.gov/fermi>. ■



Photo credit: Pat Izzo

Caption: Rob Strain presented the Public Service Group Achievement Award to Daren Iverson on behalf of the GDAIS GLAST Team.



Photo credit: Pat Izzo

Caption: Rob Strain presented the Exceptional Public Service Medal to Robb Pinkerton.

## Making Sense of Space—A Sculptor’s Journey

By Elizabeth M. Jarrell

Alan Binstock has journeyed from a kid at New York’s High School of Music and Art (now the Fiorello H. LaGuardia High School of Music, Art, and Performing Arts); to a metal foundry apprentice and yoga instructor in Colorado and in a Connecticut ashram; to a sculptor, architect, and NASA Master Planner at Goddard Space Flight Center in Greenbelt, Md. While he is a work in progress, sculpture and yoga remain constant themes throughout his life.

Binstock has exhibited his sculptures, including numerous solo shows, for over 12 years in galleries from New York to Florida, and has received critical national acclaim from *Sculpture* magazine, *The Washington Post*, and National Public Radio.

Binstock’s works are mainly constructed out of stone, glass, and steel. His abstract pieces range in size from the very small “Fruit of Knowledge” (5x5x5 inches) to his current public commission “A Pilgrim’s Quandary” that will be over 15 feet tall.

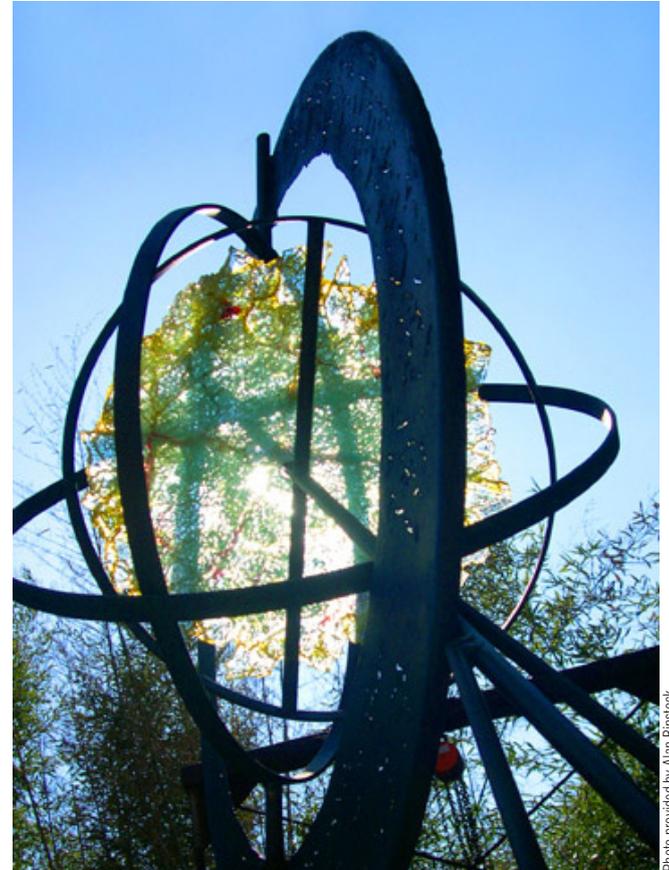


*Caption: “Arc Construction.” Glass, steatite (a type of soapstone), and steel.*

The names of his pieces reflect influences from yoga, such as “Siva’s Seedling,” to NASA, as with “COBE’s Cosmos.” Indeed, the names Binstock chooses for his sculptures are almost as interesting as the pieces themselves. Perhaps that is because they lend insight into why he made them and reflect his life journey and his quest to find inner meaning.

Binstock is the result of seemingly diametrically opposed influences. He credits four modern artists as influences: the sculptors Isamu Noguchi and

David Smith, as well as the architects Le Corbusier and Erich Mendelsohn. A common element among all four is their preoccupation with the use and design of space, especially on a monumental scale. Following in their esteemed footsteps, Binstock, too, is a sculptor of spaces on a grand scale. Other influences include his lifelong fascination with yoga, as well as satellite photographs of deep space depicting the early universe.



*Caption: “Wayfinder.” Glass and steel.*

Binstock recently described his works this way, “My work harvests images and forms from our collective past, present, and possibly future. We share memories spanning time and place and a fascination with the expression of light reflected and refracted in the macro and micro views of the cosmos. My glass and steel sculptures seek a connection of space, time, and culture.”

Binstock is currently working with glass, combining its fragility with its strength of material. He breaks up the glass and then fuses the pieces into abstract, colorful shapes. The fragility and refractive nature of the glass is then counterbalanced against the strength and opaque nature of the stone and steel. Perhaps these counterbalances reflect the tensions in his own life, between the yoga instructor, the architect, and the sculptor; and between his Eastern and Western influences. The deconstruction and then reconstruction of materials of such varied properties is this artist’s way of making sense of the universe.

Alan Binstock’s listing of upcoming exhibitions and photographs of his works can be viewed on his Web site: <http://www.alanbinstock.com>. ■

## Thinking Snow—Goddard Glaciologist Likes it Cold

By Christina Coleman

Goddard's assortment of scientists and engineers dedicated to studying the Earth and space is larger than any other institution. Not all of them, however, have visited Greenland three times, enduring the perpetual dark days of Greenland's winter for four months and never got cold. Furthermore, Lora Koenig is probably the only one who had aspirations of working at a ski resort.

"I think I've always been interested in snow," said the Oregon-native glaciologist who learned to ski when she was only 3 years old. "I don't get cold and rarely get cold on the ice sheets, except for my fingers."



Photo credit: Robin Davies

*Caption: Lora Koenig in her preferred habitat.*

Koenig is a relatively new addition to the Goddard family and the Cryospheric Sciences Lab, Code 614.1. Even though she is not directly connected with a major NASA project, her groundbreaking research with passive microwave sensing has opened the door to better understanding and monitoring the temperature and accumulation trends of polar ice sheets, which in turn help determine oceanic levels.

Koenig got her bachelor's in mathematics and environmental studies before she attended the University of Utah, where she focused on remote sensing and geographical information systems. As a NASA Jenkins Fellowship recipient, she pursued her doctorate in geophysics at the University of Washington. Koenig didn't know that her love of snow would turn into research that could change how we view snow accumulation measurements and climate change.

"I didn't know it was a possibility. I always wanted to work at NASA, but I didn't know these types of jobs were out there," Koenig said. Having enjoyed the idea of space and exploration, Koenig knew she loved math and

was certain that she wanted to do hands-on work. It wasn't until she worked with a mentor, while pursuing her graduate degree, whose focus was remote sensing of ice sheets and glaciers in Alaska that she realized she too wanted that focal point. She started working at Goddard last October.

"Lora is at the forefront of a new generation of women leaders in cryospheric sciences research," said Dorothy Hall, a Senior Research Scientist in Code 614.1. "She understands and can operate complex instrumentation in the field, and she's good at outreach and public speaking." Hall also added that Koenig has, "the scientific background, skills, and enthusiasm to move the science of cryospheric research to a new level of understanding."

It was before she officially began working at NASA, however, that Koenig jumped on the opportunity to be one of the two scientists to stay at the National Science Foundation's Greenland Summit Camp from November 2008 to February 2009 to collect measurements that would be used to validate data from NASA's *Ice, Clouds, and Land Elevation* (ICESat), *Aqua*, and *Terra* satellites.

In addition, Koenig tested temperature sensors called Thermochron iButtons that measure air temperature and the snow surface temperature. These sensors make it a bit easier to measure Greenland's temperature and validate Infrared satellites. Infrared wavelengths on satellite sensors are used to record direct measurements of surface temperatures over Greenland. The wavelengths, however, aren't long enough to penetrate clouds. That means no measurements on cloudy days. Koenig made sure the tiny instruments would be able to withstand the elements with accurate testing.

Ironically, her work in Greenland is applicable to the work she now does here at Goddard. Koenig said she thoroughly enjoyed her time in Greenland, but when asked to name her biggest accomplishment, she points out that she works at NASA and that she earned her doctorate degree. "But my life accomplishment is that I'm surrounded by family and friends that support me. When I'm away [in Greenland], they're always still there and that makes my science career easier."

When Koenig is not skiing, looking for places with "great snow," or testing Thermochrons, she is remodeling the fixer-upper she and her husband recently purchased. Being new to the area, she is still discovering Washington, D.C. She enjoys bike riding, museums, and community work with The American Red Cross. ■

## Employee Spotlight: Dorothy Hall

By Rob Gutro



Photo provided by Dorothy Hall.

*Caption: Dorothy Hall.*

The frozen areas of our Earth are changing, and NASA has a number of experts who analyze what's happening to those areas as the climate changes. One of those experts works here at Goddard and she can look at a satellite image and talk about images of ice and snow as if they were family photographs.

Dr. Dorothy K. Hall works as a Senior Research Scientist in the Cryospheric Sciences Branch at Goddard. Her job is to conduct scientific research on remote sensing of snow and ice, focusing on studies of snow cover and glacier ice.

In her years at Goddard, Dr. Hall has focused on climate-change-related issues dealing with valley glaciers, seasonal snow cover, sea ice, frozen lakes, and, more recently, surface melt of the Greenland Ice Sheet. She has been involved in field experiments in various places in the Arctic, and has organized and led snow and glacier experiments in Alaska, Canada, and the northern United States.

Dr. Hall and her colleagues at Goddard have developed a suite of snow and sea ice products from the Moderate-Resolution Imaging Spectroradiometer (MODIS), an instrument that flies aboard NASA's *Terra* and *Aqua* satellites. Those snow and sea ice products are used by more than 700 users worldwide for a variety of applications and in models.

The launch of the first MODIS on the *Terra* satellite enabled the development of global, daily snow-cover maps with unprecedented spectral, temporal, and spatial detail. There is a 9-year record that is rich with detail allowing the study of individual snow events and also time series of regional and even global snow-cover changes. "It's been very interesting and challenging to develop algorithms that provide optimal products that are useful both globally and regionally. Soon, we'll have a decade of products available to study interannual global snow-cover changes from MODIS," Hall said.

Dorothy first became fascinated with cryospheric science (specifically permafrost) when oil was discovered on the North Slope of Alaska in 1968. She decided to spend some time in Fairbanks a few years later, during college, studying about permafrost and glaciers. After receiving her private pilot's license, she became interested in aerial photography, which led to an interest in remote sensing. So it was logical to combine her interest in the cryosphere with flying and aerial photography.

Dorothy and her colleagues from the U.S. Geological Survey were documenting changes in some of the Earth's smaller glaciers from space long before this became a hot topic. Globally, valley glaciers are shrinking on all continents—except Australia where there are no glaciers—due to global warming.

"Valley and mountain glaciers and ice caps can respond to changes in climate on the scale of years. Thus, they can serve as indicators of regional climate change," Hall said. "During the last century, most valley and mountain glaciers and ice caps have receded, although some advances have occurred during periods of cooling and for other reasons. Some smaller glaciers that formed during the "Little Ice Age" (13<sup>th</sup> to 19<sup>th</sup> centuries) are doomed because they are out of balance with the present climate. We will continue to monitor these glaciers from space and to document their disintegration if the warming continues at the present rate."

Dorothy has used the Landsat thematic mapper and the enhanced thematic mapper plus data extensively to study changes in valley glaciers because of the high resolution provided by the Landsat satellite series of instruments. For larger glaciers and studies of the Greenland Ice Sheet, she also uses MODIS data and data products that have the advantage of having more-frequent coverage than is possible to obtain with Landsat.

Dr. Hall has been a Distinguished Visiting Scholar at the University of Delaware Department of Geography and an Affiliated Professor in the Earth Sciences and GeoInformation Systems Department at George Mason University. She has given lectures at many universities and scientific meetings, and has authored numerous journal articles and book chapters. She has also co-authored the book *Remote Sensing of Ice and Snow*. In addition, she has worked with Goddard's Scientific Visualization Studio on cryosphere animations, videos, and educational materials.

Dorothy is currently a principal investigator on two NASA research projects: "Development of a Climate-Data Record of the Surface Temperature of the Greenland Ice Sheet," and "Enhancement and Validation of the MODIS Snow and Ice Product Suite." She is a co-investigator on several other NASA projects relating to the study of ice or snow using remote sensing.

Dorothy's hobbies include fitness walking, travel, reading, gardening, and crafts. She also tries to keep track of her three grown sons—the older two have moved out of the area and the youngest is still in college. ■