National Aeronautics and Space Administration
www.nasa.gov
Volume 4, Issue 21
December 2008

Goddard View

Wallops Recognized as Part of Virginia History

Pg 2

Goddard Hits the Big Time with Best of '08 FilmFest

Pg 7

Goddard Scientist Receives Nordberg Award

Pg 12

Wallops Recognized as Part of Virginia History

By Keith Koehler

A Virginia historical marker recognizing the contributions of NASA's Wallops Flight Facility to aerospace research was unveiled November 22, 2008 at the entrance to the Wallops Visitor Center.

The nomination of Wallops as a historic site was provided by the Virginia Aeronautical Historical Society (VAHS) and supported by the Virginia Department of Historic Resources and the Virginia Department of Aviation.

Established in 1945 by the National Advisory Committee for Aeronautics, Wallops is one of the oldest launch sites in the world. During its 63 year history, Wallops has contributed to both aeronautical and space flight research.

The unveiling ceremony included comments by local, state, and NASA officials. The Commonwealth's marker includes a history of Wallops and the contributions of the facility to Virginia and the surrounding community.

The event was hosted by BaySys Technologies, Accomac, Va., on behalf of the Virginia Aeronautical Historical Society. ■

Photo credit: Jacob Owen

Caption: Participating in the unveiling were (left to right) Bill Schultz, Chairman of the VAHS Historical Marker Committee; Randall Burdette, Director of the Virginia Department of Aviation; Dr. John Campbell, Director of NASA's Wallops Flight Facility; Ron Wolff, Chairperson of the Accomack County Board of Supervisors; and Joanna Wilson, Virginia Department of Historic Resources.

Table of Contents

Goddard Updates

Wallops Recognized as Part of Virginia History – 2

Goddard Employees Get an Inside Look at SAM – 3

Swift Looks to Comets for a Cool View – 4

Exploration Sciences Building Construction Update – 5

Scientists Have a New Online Scientific Tool for Hurricane Research – 6

Goddard Hits the Big Time with Best of '08 FilmFest – 7

Jump into Space with NASA's *Hubble* and *James Webb Space Telescopes* Interactive Exhibit in Pittsburgh – 8

Exploring Leadership Colloquia Series Presents Freddie Ravel's "Tune Up to Success" – 9

2008: Unparalleled Excellence at NASA's Goddard Space Flight Center– 10

Goddard Family

Goddard Scientist Receives Nordberg Award – 12

Cover caption: The unveling of a Virginia historical marker celebrating Wallops' contribution to aerospace research.

Photo credit: Jacob Owen.

GoddardView Info

Goddard View is an official publication of the Goddard Space Flight Center. It is published biweekly 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 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 john.m.putman@nasa.gov. Ideas for new stories are welcome but will be published as space allows. All submissions are subject to editing.

Goddard Employees Get an Inside Look at SAM

By John Putman

On Friday, November 5, Goddard employess got the chance to learn about the Sample Analysis at Mars (SAM) mission. Members of the SAM team introduced fellow Goddard employees to SAM's mission and scientific goals.

As part of the 45 minute tour, employees were first treated to a DVD presentation featuring the SAM mission movie trailer and interviews with the SAM team members.

The tour's next stop was the SAM Development Laboratory. Here, employees got to see a large working model of SAM and hear more about the instruments going to Mars.

The final stop of the tour was filled with models and instruments. There was also an animation of the Mars Science Laboratory (MSL) landing on the surface of Mars.

The SAM instrument suite is a suite of instruments that will be onboard the MSL rover. The SAM team consist of scientists and engineers at Goddard, the University of Paris/Centre National de la Recherche Scientifique (CNRS), NASA's Jet Propulsion Laboratory, Honeybee Robotics, and many additional external partners. SAM's five science goals will address three of the most fundamental questions about the ability of Mars to support life—past, present, and future.

To find out more about SAM, MSL, and Goddard's Atmospheric Experiments Laboratory, visit: http://ael.gsfc.nasa.gov. ■

Photo credit: Debora McCallum

Caption: Florence Tan, Electrical Systems Engineer, explains the SAM mission.

Photo credit: Debora McCallum

Caption: Carol Lilly, Integration and Testing Lead for SAM, answers questions from one of many SAM tour groups visiting Building 33.

Photo credit: Debora McCallum

Caption: Tour groups watched a DVD presentation on the MSL mission.

Photo credit: Debora McCallum

Caption: An employee tour group gets to know SAM.

Swift Looks to Comets for a Cool View

By Francis Reddy

NASA's *Swift* gamma-ray explorer satellite rocketed into space in 2004 on a mission to study some of the highest-energy events in the universe. The spacecraft has detected more than 380 gamma-ray bursts—fleeting flares that likely signal the birth of a black hole. Since its launch in 2004, *Swift* has observed 80 exploding stars and studied 6 comets.

Comets are "dirty snowballs" made of frozen gases mixed with dust. X-rays come from superhot plasmas. What do cold comets have in common with exploding stars or the birth of black holes?

"It was a big surprise in 1996 when the NASA–European Space Agency *Roentgen* satellite (ROSAT) mission showed that comet Hyakutake was emitting X-rays," says Dennis Bodewits, a NASA postdoctoral fellow at the Goddard Space Flight Center in Greenbelt, Md. "After that discovery, astronomers searched through ROSAT archives. It turns out that most comets emit X-rays when they come within about three times Earth's distance from the Sun."

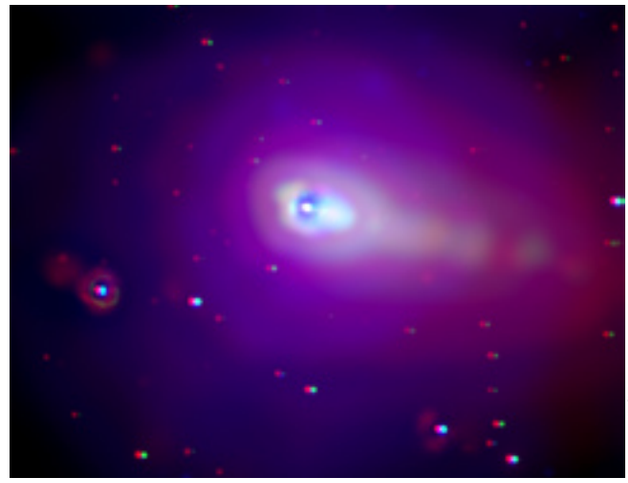

Image credit: Stefan Immler and Dennis Bodewits

Caption: This composite of red, green, and blue images, taken May 2, 2006 through Swift*'s optical and ultraviolet filters, shows a colorful side of Comet 73P/Schwassmann-Wachmann 3. Red and green reveal carbon and dust particles, while blue shows hydroxyl molecules—the result of sunlight breaking apart water.*

Bodewits is working with the *Swift* team at NASA's Goddard Space Flight Center to study comets using data from the spacecraft's Ultraviolet/Optical Telescope (UVOT) and X-Ray Telescope (XRT). "*Swift* is an excellent platform for studying dynamic processes in comets," he says.

Ultraviolet wavelengths let astronomers identify the chemical composition of the comet's atmosphere, observe the structure of dust emission, and identify the rotation of the comet's icy nucleus. X-rays reveal the structure of the comet's gas and the state of the solar wind, a stream of charged particles that flows from the Sun at speeds upwards of 900,000 mph.

Thanks to image processing from team member Stefan Immler, *Swift*'s UVOT captured a striking sequence that shows unresolved blobs of dust trailing from a crumbling comet. In early May 2006, when the largest fragment of Comet 73P/Schwassmann-Wachmann 3 (SW3) passed Earth, *Swift* monitored its approach.

The piece, known as fragment C, is believed to be the comet's main body, which began splintering in 1995. In 2006, astronomers counted 66 fragments. Telescopes—including NASA's *Hubble* and *Spitzer*—revealed dust and condensations trailing several pieces. But fragment C showed no unusual changes—except to *Swift*'s ultraviolet eye. "It's subtle, but *Swift* caught clouds of dust and perhaps small pieces that no one else was able to," Immler says.

The UVOT also includes an ultraviolet grism, which combines a grating with a prism to separate incoming light by wavelength. "*Swift*'s grism spans the wavelengths where carbon-bearing molecules and the hydroxyl molecules are most active. This gives us a unique view into the types and quantities of gas a comet produces, and that gives us clues about the origin of comets and the solar system," Bodewits explains. In fact, with the failure of the *Hubble Space Telescope*'s ultraviolet spectrograph in 2004, *Swift* is currently the only space observatory covering this wavelength range.

As a comet's surface warms near the Sun, the ices turn to gas and form a tenuous atmosphere, or coma, measuring hundreds of thousands of miles across. The solar wind pushes this gas back to form a comet's glowing gas tail. X-ray emission is a side effect of this interaction.

The X-rays arise through a process called charge exchange. Fast-moving ions in the solar wind snatch electrons from uncharged atoms in the comet's atmosphere. The solar wind ions give off X-rays as the relocated electrons settle into their new home. Because the interaction occurs over such a broad region, the total power output of these emissions can reach one billion watts.

Charge exchange may play important roles in any objects where hot, expanding gas collides with cooler gas. One example: young stars interacting with the gas and planets that might surround them. Comets provide excellent laboratories to explore these interactions.

Continued on Page 5

Swift Looks to Comets for a Cool View

Continued from Page 4

When Comet 17P/Holmes underwent a surprising outburst in October 2007, Bodewits tasked both *Swift* and NASA's *Chandra X-ray Observatory* to observe it. "The comet was too bright to observe with the UVOT. We were afraid we'd damage the instrument," Bodewits says. "Despite this, we're still not sure whether we detected Holmes with the XRT or *Chandra*."

At the time of the outburst, Holmes was about 19 degrees above the ecliptic, the plane in which the planets orbit the Sun. At that elevation, the comet was probably experiencing a cooler, steadier flow from the solar wind. "The source of this cooler flow wasn't hot enough to produce the ions Holmes needed to make X-rays," Bodewits notes.

Four years ago, *Swift* captured its first X-rays. The radiation came from Cygnus X-1, one of sky's strongest sources at these energies. The system, located within our galaxy, contains a blue-giant star orbited by a black hole.

"*Swift* has operated two years longer than we had hoped," says Neil Gehrels, the mission's Lead Scientist at NASA's Goddard Space Flight Center. "And while gamma-ray bursts and stellar explosions are the satellite's bread and butter, it's clear that *Swift* has a lot to contribute to other areas of astronomy."

For more information on *Swift*, visit: http://www.nasa.gov/swift. ■

Exploration Sciences Building Construction Update

By Rob Gutro

"The construction is nearly 84% complete, but the next 7 months will be very busy," said David Larsen, Exploration Sciences Building (ESB) Project Manager at Goddard. "The permanent power will be turned on within the next 2 months, which will allow the mechanical equipment (pumps, motors, air conditioning units) to be activated. Additionally, power panels, outlets, and lighting will be activated."

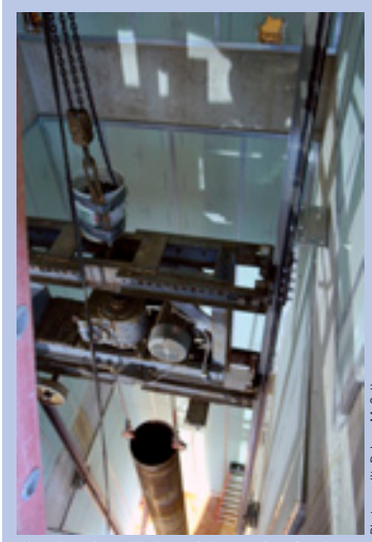

Photo credit: Debora McCallum

Caption: Installation of the casing for the hydraulic elevator. The piston for the hydraulic elevator rides inside the steel casing shown in the picture.

Currently, the contractor is installing drywall partitions, communication wiring, ceiling tile grids, and bathroom ceramic tile. Larsen said that the windows and siding are being installed to get the building dried in. Temporary heat is now running in the building and once the building warms up, the drywall, painting, and floor finishing can start. ■

Photo credit: Debora McCallum

Caption: The third floor office wing of the ESB.

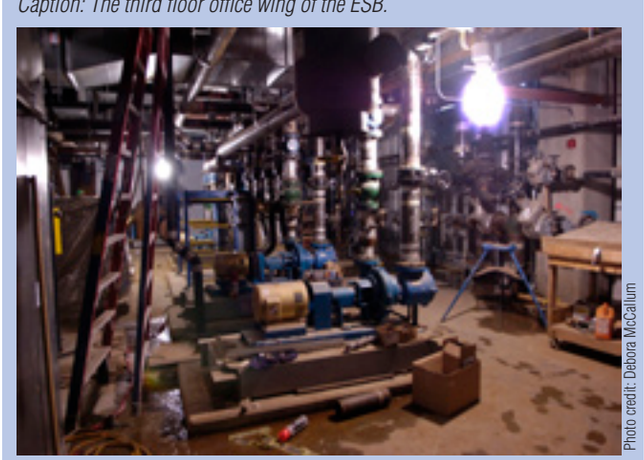

Photo credit: Debora McCallum

Caption: The second floor mechanical room. In the foreground are the hot water pumps for the building's labs.

Scientists Have a New Online Scientific Tool for Hurricane Research

By Rob Gutro

Scientists, students, and application users seeking on-the-fly visualizations and hurricane-related satellite and model data can now access it via the NASA Hurricane Data Analysis tool online. This tool was created by the Goddard Earth Sciences Data and Information Services Center (GES DISC) at the Goddard Space Flight Center in Greenbelt, Md., to help provide valuable hurricane research information, as well as easy data access to a collection of multi-sensor data sets.

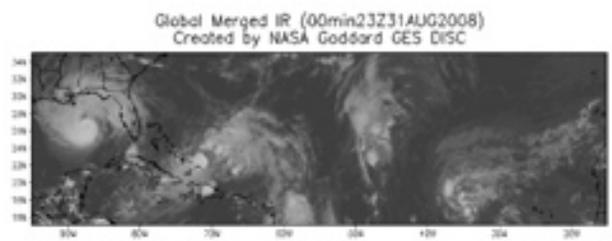

Photo credit: NASA

Caption: A large scale image from August 31, 2008 showing Hurricane Gustav, Tropical Storm Hanna, and Tropical Storm Ike (from left to right) generated using the Hurricane Data Analysis Tool.

Before selecting and downloading the tropical cyclone data of most interest, the Goddard Hurricane Data Portal will assist researchers to investigate key parameters for tropical cyclones, hurricanes, and typhoons around the world.

The data sets available include:

- Global merged infrared (IR) brightness temperature
- *Tropical Rainfall Measuring Mission* (TRMM) precipitation
- TRMM microwave imager sea surface temperature
- NASA's daily Quick Scatterometer (QuikSCAT) ocean surface wind
- National Centers for Environmental Prediction (NCEP) reanalysis sea-level pressure and NCEP reanalysis winds.

The Hurricane Data Analysis Tool (formerly the TRMM QuikSCAT Analysis tool) allows users to look at a hurricane event with current functions that include area (latitude-longitude) and time series (area averaging) plots and their overlays, as well as animations. The Web site is located at: http://disc.gsfc.nasa.gov/hurricane/trmm_quikscat_analysis.shtml.

The Web site will also help researchers investigate other meteorological phenomena such as precipitation, monsoon events, mesoscale convective systems, and more. The Web site also features current tropical analysis maps and profiles from NASA satellites.

The images available on the Web site are generated daily with the latest available data. Past hurricane events can be viewed in the archive, which contains pre-generated images from multiple data sets, including true-color images from the Moderate Resolution Imaging Spectroradiometer (MODIS), and vertical profiles of water vapor and temperature from the Atmospheric Infrared Sounder (AIRS) instrument.

The NASA Hurricane Data Portal, a working online prototype, is the result of a team effort led by Gregory Leptoukh of Goddard, together with NASA contractors, university scientists, and summer students.

"We plan to feature useful data from other NASA satellites that users have requested and are anxiously waiting for," said Steve Kempler, GES DISC Project Manager. "Users will be able to access cloud properties from MODIS that flies on NASA's *Terra* and *Aqua* satellites; and look at animations of surface reflection, ozone, and clouds from the Ozone Monitoring Instrument (OMI) that flies on NASA's *Aura* satellite." OMI is an instrument supplied by the Netherlands Agency for Aerospace Programs in collaboration with the Finnish Meteorological Institute.

The newest addition to the collection of available data products is the online visualization of the global merged-IR product. "With a Web browser and few mouse clicks, users can produce visualizations for all 8 years and 4.5 terabytes of merged IR brightness temperature data, and generate black and white IR imagery and animation without downloading any software and data," Kempler said.

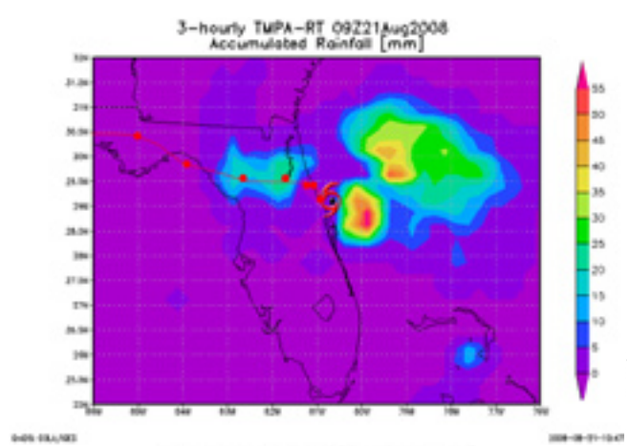

Photo credit: NASA

Caption: Tropical Storm Fay as viewed by the TRMM 3B42RT product on August 21, 2008.

More extensive interactive access to other data, as well as online visualization and statistical analyses, are available via the operational Giovanni system at: http://giovanni.gsfc.nasa.gov. Giovanni is a Web-based application developed by the GES DISC, which provides a simple and intuitive way to visualize, analyze, and access vast amounts of Earth science remote sensing data without having to download the data.

Hurricane season in the Atlantic Ocean may run from June 1 to November 30, but tropical cyclones happen around the world at all times during the year, so these tools will be very popular throughout the year.

For the Hurricane Data Portal, visit: http://disc.gsfc.nasa.gov/hurricane. For more information about GES DISC, visit: http://disc.gsfc.nasa.gov. ■

Goddard Hits the Big Time with Best of '08 FilmFest

By Andrew Freeberg

On December 11 and 12, hundreds of Goddard employees were treated to a dozen videos produced by Goddard's Scientific Visualization Studio (SVS). Employees cast their votes for their favorites in four categories: best communication of scientific concepts, best Goddard presenter, best promo or music video, and best new mission video. Viewers also voted for the overall audience favorite.

Here are the winners, and links to view them, as voted by you. To see all of the featured videos, visit the SVS Web site at: http://svs.gsfc.nasa.gov/index.html.

Best Communication of Scientific Concepts: "Towers in the Tempest"
http://svs.gsfc.nasa.gov/goto?3413

Best Goddard Presenter: Kevin Boyce for "Goddard's Spacecraft Chamber of Horrors"
http://svs.gsfc.nasa.gov/goto?10239

Best Promo or Music Video: "THEMIS Launch and Deploy Music Video"
http://svs.gsfc.nasa.gov/goto?10103

Best New Mission Video: "Last Mission to *Hubble*"
http://svs.gsfc.nasa.gov/goto?10346

Overall Audience Favorite: "Last Mission to *Hubble*"

The mission of the Scientific Visualization Studio is to facilitate scientific inquiry and outreach within NASA programs through visualization. The SVS works closely with scientists in the creation of visualization products, systems, and processes in order to promote a greater understanding of Earth and space science research activities at Goddard Space Flight Center. ■

Photo credit: Debora McCallum

Caption: Goddard employees watch and learn about aerosol interaction with clouds.

Photo credit: Debora McCallum

Caption: A computer-generated rover scoots across the Martian landscape.

Photo credit: Debora McCallum

Caption: Goddard employees see things on a molecular level.

Jump into Space with NASA's *Hubble* and *James Webb Space Telescopes* Interactive Exhibit in Pittsburgh

By Rob Gutro and Mike Marcus

The "New Views of the Universe: *Hubble Space Telescope*" exhibit recently received a new addition and now includes an interactive section on the *James Webb Space Telescope*. With the new addition, the exhibit spans almost 3,000 square feet. This interactive exhibit allows visitors to learn about the science and the engineering marvels of the *Hubble Space Telescope* (HST) and the *James Webb Space Telescope* (JWST).

The exhibit has traveled to science centers in South Carolina; Richmond, Va.; and the National Soaring Museum in Elmira, N.Y. Currently, the exhibit is in Pittsburgh, Pa., and has plans in 2009 to travel to the Museum of Natural History in Ann Arbor, Mich. at the University of Michigan; the Buffalo Museum of Science in Buffalo, N.Y.; and Fort Wayne, Ind.'s Science Central.

Photo Credit: Russell Werneth

Caption: The universe display and the Hubble Space Telescope *model.*

Several interactive games are featured in the exhibit. You can step through distances in the universe with the "Cosmic Distance Scale." "Scope it Out!" teaches players about two different types of telescopes and shows how the *Webb* Telescope is similar, yet different than other telescopes. One of the exhibits will also offer a comparison between the *Hubble* and JWST.

On December 10, Nobel laureate John Mather, Project Scientist for JWST, and Russ Werneth, HST Outreach Specialist and former HST Extravehicular Activity (EVA) Manager, gave presentations to more than 200 guests in the Buhl Planetarium at the Carnegie Science Center in Pittsburgh, Pa.

Dr. Mather talked about his research with the *Cosmic Background Explorer* (COBE) and confirmation of the Big Bang Theory, and why we need the *James Webb Space Telescope*. He also explained how the new observatory, planned for launch in 2013, will be far larger and more powerful than *Hubble* for infrared observations, but will not replace *Hubble*'s capabilities for visible and ultraviolet measurements.

NASA is building JWST in partnership with the European and Canadian space agencies. It will orbit the Sun–Earth Lagrange point L2, a million miles from Earth, to allow the telescope to cool to a temperature of 40 Kelvin.

Mr. Werneth spoke about the engineering behind the science for extravehicular activities and the unique tools used by astronauts during these spacewalks. He shared how the team of Goddard engineers and scientists, and the astronauts train and retrain to do this delicate work. He noted that each time the telescope is serviced, a new and improved *Hubble* is returned to orbit with more powerful science instruments and a longer life to continue providing amazing scientific images and discoveries. The audience was given a homework assignment to look for news about the fifth servicing mission, planned for May 2009.

This event was held after hours when the science center was closed and attendance was limited to the first 200 people who signed up to attend. The folks who attended were thrilled to be there and asked many great questions.

After both presentations concluded, Mather treated the visitors to a signing of his newly released book, "Very First Light." Visitors snatched up all the HST and JWST lithographs, fact sheets, posters, and pins. Even though the night was getting late, these space enthusiasts weren't too tired to visit the exhibit and ask more questions.

For those who can't get to the exhibit in Pittsburgh, it's also available online on the NASA *Webb* Telescope Web site: http://jwst.gsfc.nasa.gov/exhibit.html.

The *Hubble* traveling exhibit was developed by the Space Telescope Science Institute and the Smithsonian Institution Traveling Exhibition Service (SITES). This major 2,000 square foot traveling exhibition has been fully updated and is now available at low cost directly from the *Hubble* Project Office at NASA's Goddard Space Flight Center, on the Web at: http://hubble.nasa.gov/index.php.

The *James Webb Space Telescope* is expected to launch in 2013. The telescope is a joint project of NASA, the European Space Agency, and the Canadian Space Agency.

For more information on *Hubble*, visit: http://hubble.nasa.gov. For more information on the J*ames Webb Space Telescope*, visit: http://www.jwst.nasa.gov. ■

Exploring Leadership Colloquia Series Presents Freddie Ravel's "Tune Up to Success"

By Gail Williams

The new season of the Exploring Leadership Colloquia Series began on October 23 with a powerful and moving presentation by Grammy award-winning musical lyricist, author, and pianist Freddie Ravel. In 2002, Freddie's lifelong commitment to raise human potential through music gave birth to his unique keynote concert, "Tune Up To Success."

At the colloquium, Freddie posed the question: what if everyone listened and communicated with each other in a way that maximized the quality of their personal and professional success? He revealed how music is much more than entertainment—it is actually a power tool for life. Virtually all organizations and focused individuals have a mission. The challenge is often for those individuals to understand and communicate that purpose. Yet undermining our ability to do so is that we often indulge in passive listening. Statistics show that people remember only half of what they hear—even moments after hearing it. One way to enhance our listening ability, our leadership effectiveness, and the quality of connection with others is to actively and generously listen.

Photo Credit: Pat Izzo

Caption: Freddie Ravel helps tune up a Goddard employee.

The many people in attendance agreed that music is the world's international language. Freddie shared what he calls the "Four Foundations of Music": melody, harmony, rhythm, and score. He related that these foundations are central to who we are, how we interact, and the way we conduct and manage our time.

Playing classical, jazz, and popular music on a grand piano, Freddie blended music, speaking, and audience participation to reveal the art of becoming a master listener. Guiding his audience to "tune up" to one another, Freddie highlighted the similarities between harmonious music, creativity, leadership, cultural diversity, and consistent success. He invited the audience to contribute their own melody, harmony, rhythm, and score in pursuit of their personal and Goddard's organizational goals. Freddie left the audience with the following four tune up tips:

- The foundation of self-empowerment is to recognize that you have a melody within and to express it. He defined melody as the unique signature of a song and each person's unique signature as well, stating that when you truly know your melody, you can play through any storm. To emphasize his point, Freddie quoted Aristotle: "Where your talents and the needs of the world intersect, there lies your vocation." When you truly know your melody, you can play through any storm.
- Active listening is the key to harmony. Active listening requires listening for the question behind the statement. As in life, harmony begins when two or more melodies meet one another. This time, Freddie quoted Lee Iacocca, "People need to listen at least as much as they need to talk, for too many people fail to realize that real communication goes in both directions."
- Rhythm puts your melody and harmony in sync. Rhythm creates synergy where the whole is greater than the sum of its parts. As Duke Ellington said, "It don't mean a thing if it ain't got that swing."
- Score is the hard copy mission statement of your melody, harmony, and rhythm. Ludwig van Beethoven quote is quite pertinent here, "Music is a higher revelation than wisdom and philosophy. Music is the electrical soil in which the spirit lives, thinks, and invents."

You can view the schedule of upcoming colloquia and view Webcasts of previous colloquia at the Exploring Leadership Colloquium Web site at: http://exploringleadershipcolloq.gsfc.nasa.gov. ■

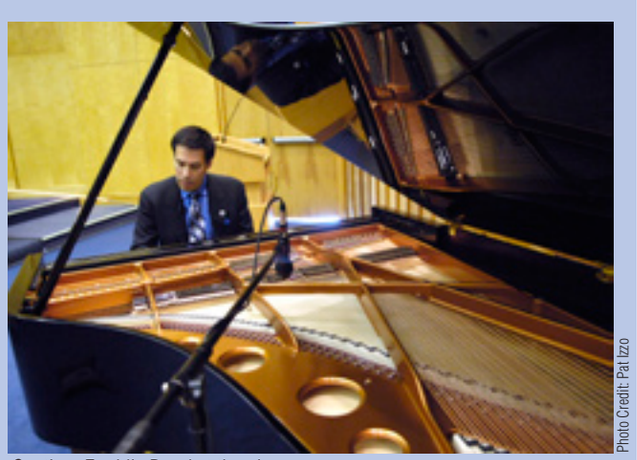

Photo Credit: Pat Izzo

Caption: Freddie Ravel at the piano.

2008: Unparalleled Excellence at NASA's Goddard Space Flight Center

By Amy Pruett

NASA's Goddard Space Flight Center has experienced a phenomenal year. Adding to NASA's 50 years of unparalleled leadership in innovative research and discovery, Goddard has numerous reasons to celebrate during these last few weeks of 2008.

On December 12, the Center gathered for an all hands meeting with Center Director Rob Strain to celebrate a year with a broad set of challenging goals and significant accomplishments. Through dedication and hard work, the Goddard team made significant contributions to putting ideas into space and bringing knowledge home.

Goddard currently manages 35 missions and is actively preparing for 10 more to launch in 2009 and beyond. The *Coupled Ion Neutral Dynamic Investigation* (CINDI), the *Fermi Gamma-ray Space Telescope*, and the *Interstellar Boundary Explorer* (IBEX) all launched in 2008, all of which will add to scientific understanding.

After years of engineering and thousands of hours of manpower, NASA's *Hubble Space Telescope* team stood poised for an October launch of *Hubble*'s fifth and most complex servicing mission. A significant malfunction in the *Hubble*'s control unit/science data formatter in late September delayed the mission, but the team remains energized, looking toward a launch in May 2009. In the meantime, *Hubble* continues to share its remarkable perspective of the universe, thanks to the stellar *Hubble* team at Goddard.

Along with Goddard's missions, there have been many significant achievements in specific science-related fields and technology.

Earth science accomplishments include the build and integration of the *Glory* spacecraft, shipment of NOAA-N Prime to Vandenberg, preparation of the *Geostationary Operational Environmental Satellite* (GOES)-O spacecraft for launch in 2009, management of over 3.2 terabytes of new data daily by the Earth Science Data and Information Systems (ESDIS) program, establishment of the ICESat-II project, and the successful completion of Wallops' airborne science Arctic Research of the Composition of the Troposphere from Aircraft and Satellites (ARCTAS) aircraft mission.

In astrophysics, *Fermi* launched successfully, *Hubble* achieved many scientific discoveries, the *James Webb Space Telescope* has been approved to enter its design phase, the Joint Dark Energy Mission observatory was assigned to Goddard, and the *Gravity and Extreme Magnetism* Small Explorer moved into its Phase A study.

Heliophysics oversaw the completed environmental testing of the *Solar Dynamics Observatory* (SDO) and is waiting for a launch readiness date; CINDI launched, as well as IBEX; the *Astronomy of Ice in the Mesosphere*

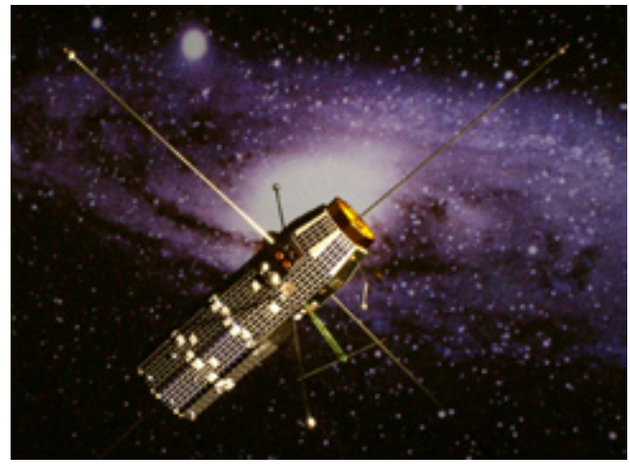

Image credit: U.S. Air Force

Caption: Computer-generated image of the C/NOFS probe. NASA's CINDI instrument is installed on C/NOFS.

(AIM) mission recovered after a spacecraft receiver anomaly; and *Voyager 2* crossed the Termination Shock, revealing new, complex interactions.

Significant achievements in planetary science include Goddard's winning of the *Mars Atmosphere and Volatile Evolution* (MAVEN) mission, integration of the Sample Analysis at Mars (SAM) instrument suite, as well as receiving Juno mission confirmation—Goddard will contribute the magnetic field investigation.

Exploration system successes include the integrated *Lunar Reconnaissance Orbiter* (LRO), support from Wallops of the Max Launch Abort System (MLAS), a part of the new Orion Crew Exploration Vehicle (CEV), and support to the *Constellation* program, which included avionics, crew aids and tools, unpressurized cargo, and systems and disciplinary engineering support.

Photo credit: NASA

Caption: Test of the Max Launch Abort System (MLAS).

In space communications and navigation, the Tracking and Data Relay Satellite (TDRS) system celebrated its 25th anniversary of successful communication services, Express Logistics Carriers (ELC) were assembled for delivery to the *International Space Station*, and the Space Network achieved 99.3% operational proficiency.

Continued on Page 11

2008: Unparalleled Excellence at NASA's Goddard Space Flight Center

Continued from Page 10

In addition to mission and scientific accomplishments, Goddard celebrates other achievements.

Execution performance of the FY08 budget was outstanding. Numerous teams and Goddard employees were acknowledged for their exceptional support through NASA and outside awards and recognition.

The Exploration Sciences Building, said to be NASA's greenest building, is on target for an opening in summer 2009. New facilities were built: the NuSTAR Mirror Fabrication Facility at Greenbelt and the Special Payload Processing Facility (PFF) at Wallops.

Information technology oversaw the transition to NOMAD and a new Goddard intranet, InsideGoddard.

Goddard also successfully shared its story through a variety of public outreach opportunities.

In February of 2008, public television station WETA aired a half-hour television program featuring an exclusive, behind the scenes tour of our Center, and highlighted our major achievements in space.

Yuri's Night celebrated the anniversary of humankind's first foray into space and the first Space Shuttle flight. Goddard teamed with the Space Generation Advisory Council to host a world space party on April 12. More than 700 visitors joined in on the celebration.

In June 2008, Senator Barbara Mikulski joined us to celebrate the formation of a new nonprofit organization to create a Science, Exploration, and Education Center (SEEC) at Goddard.

Goddard employees supported the 42nd Annual Smithsonian Folklife Festival held June 25–July 6. The Goddard community and its mission were represented to over one million festival attendees.

Photo credit: Bill Hrybyk.

Caption: Approximately 11,000 visitors discovered the Center at LaunchFest.

Goddard opened its gates on September 13, 2008 to celebrate LaunchFest, with approximately 11,000 people visiting our Center.

Goddard hosted the Discovery Education 3M Young Scientist Challenge competition finals on October 5 and 6. A documentary of the event will be produced for airing on the *Discovery* Channel in early 2009.

Center Director Rob Strain summarized 2008 as a year of accomplishments. "When I met with you my first week here, I committed that we would continue to work on challenging, important, and relevant space and Earth science missions. We would hire and retain a great and diverse work force; we would provide a great environment for our folks to work; and we would continue our work in leveraging our contractor base that makes all of our work possible here…we've had accomplishments in all of those areas."

For additional information on Goddard's 2008 accomplishments, view the archived Webcast of the December 12 All Hands with Center Director Rob Strain at: http://mediaman.gsfc.nasa.gov/asx/GSFC/PAO/2008/GSFC-All-Hands-20081209.asx. ■

Goddard Scientist Receives Nordberg Award

By John Putman

On November 7, Goddard scientist Dr. Wei-Kuo Tao was awarded the 2008 William Nordberg Memorial Award. The award was given at the award and lecture scientific colloquium in the Goett Auditorium in Building 3.

As NASA's preeminent expert on cloud systems, which is an essential component of Earth's climate system, Dr. Tao was recognized for his scientific contributions over the past three decades. His work has increased the fundamental understanding of how cloud systems work, spanning the full spectrum of physical processes and types of systems.

Photo credit: Bill Hrybyk.

Caption: Dr. Wei-Kuo Tao receives the William Nordberg Memorial Award from Center Director Rob Strain.

Tao is the primary developer of the Goddard Cumulus Ensemble (GCE) model and the leader of the Goddard Mesoscale Modeling and Dynamics Group. He has published over 160 refereed papers in journals, books, and monographs, and has served on many national and international committees and programs. Currently, he is Chair of the American Geophysical Union Committee on Precipitation and Clouds. He has won numerous NASA and external awards, including the NASA Exceptional Scientific Achievement Medal in 2002. He is a fellow of the Royal Meteorological Society and the American Meteorological Society.

Tao, a native of Taiwan, received his bachelor's degree in atmospheric physics from the National Central University of Taiwan in 1974, and his doctorate in atmospheric sciences from the University of Illinois in 1983. He has been at Goddard since 1982, first as a research associate of the National Research Council, National Academy of Sciences; then as senior research associate of General Sciences Corporation. Soon after becoming a naturalized U.S. citizen, he was hired by Goddard in 1989 as a civil servant scientist in the Laboratory for Atmospheres. In addition to work at Goddard, he holds adjunct faculty appointments at Texas A&M University and Colorado State University. Tao's research expertise is in precipitation and cloud system modeling, water and energy cycles studies, and satellite data utilization.

In addition to the award ceremony, attendees were treated to a lecture by Susan Solomon from the National Oceanic and Atmospheric Administration (NOAA). Solomon is a NOAA atmospheric chemist who was one of the leaders of the United Nations' Intergovernmental Panel on Climate Change (IPCC) that shared the Nobel Peace Prize in 2007.

The first part of Solomon's talk summarized key evidence from the 2007 report of the IPCC on changes in Earth's climate, and the causes of those changes. The second part of the talk reviewed findings that were not detailed in the IPCC report on the time scales of climate changes due to carbon dioxide increases.

The William Nordberg Memorial Award for Earth Science is given annually to a Goddard scientist who best exhibits the characteristics of Dr. Nordberg's career: broad scientific perspective, enthusiastic programmatic and technical leadership on the national and international levels, wide recognition by peers, and substantial research accomplishments in understanding Earth system processes. ■

Photo credit: Bill Hrybyk.

Caption: Susan Solomon discusses climate change.