National Aeronautics and Space Administration

The Critical Path

A Flight Programs and Projects Directorate Quarterly Publication
A Newsletter Published for Code 400 Employees

Volume 13 number 3
2005 Summer/Fall Quarters

INSIDE THIS ISSUE:

NOAA-18 (N) - In Flight

The NOAA-N satellite was launched on May 20, 2005 at 10:22 GMT on a Boeing Delta II vehicle from the Vandenberg Air Force Base (VAFB), California. This was the first launch of a POES satellite on a Delta vehicle and NOAA-N was the first launch in the latest series of the last two satellites to be provided to NOAA in support of the polar weather satellite program begun in 1960. The last satellite, NOAA-N Prime, was severely damaged in an accident at the Sunnyvale facility. This satellite is being rebuilt for a planned launch in December 2007. The program will then transition to National Polar-orbiting Operational Environmental Satellite System (NPOESS), the follow-on joint polar program designed to support the meteorological requirements of both the NOAA civilian and Department of Defense user communities. The NPOESS Preparatory Project (NPP) managed at Goddard

(NOAA-N Continued on page 10)

GOES-N Set to Launch

As we go to press, GOES-N is set to lift off from the Cape Canaveral Air Force Station (CCAFS). The Geostationary Operational Environmental Satellite-N is the latest in a series of Earth monitoring satellites. The GOES program is a joint effort of NASA and the National Oceanic and Atmospheric Administration (NOAA).

(GOES-N Continued on page 28)

Message from the Director Of

Greetings:

We are starting a new fiscal year, a year of continuing challenges and opportunities. Each of you are asked daily to meet demanding technical requirements within constrained schedule and funding limitations and-to the amazement of our customer community-you always find a way to minimize the impacts of uncertain budgets and funding profiles, while solving the problems associated with the development of state-of-the-art science and exploration missions. I do not expect that the environment will change much in the foreseeable future. NASA is being challenged to aggressively pursue the President's Exploration Initiative while meeting our existing commitments. Business as usual will result in the usual results. This is no longer good enough. Fortunately, we have within the Flight Programs and Projects Directorate a cadre of agile, innovative and highly experienced personnel that has demonstrated the capability to meet each of these challenges.

Moving forward in the most effective manner will also require a recognition that simply displaying the characteristics of agility and innovation is no longer sufficient. We will be asked to examine every aspect of the way we implement our programs, projects and missions. Starting with our support to our science community in the very initial phases of pre-formulation activities, and continuing through our orbital operational responsibilities, we must carefully evaluate how we allocate and spend our resources – people, funding, schedule and facilities. Never in my almost 40 years at Goddard have I witnessed a more rigorous assessment of every activity we support. While these assessments are often faced with trepidation, we are being asked to validate operating principles and approaches that most of us have taken for granted "forever" – the resulting direction modifications for Goddard will only make us stronger and more competitive for the future.

Finally, I would like to share a message that I have been conveying to the communities outside of the FPPD, GSFC and NASA. I am gratified that the organizations we support, in both the Executive and Legislative branches, are profoundly interested in how the Goddard FPPD contributes directly to meeting the nation's space program implementation. In my view, we at Goddard are responsible for the "enabling" of Earth and Space Science, and Exploration; although we do not always do the work, we make the accomplishment of the work possible. The Goddard core competencies – End-to-End systems engineering and mission management, space communication, science management, and science instruments/sensors – enable the accomplishment of the GSFC and NASA mission. The number and complexity of the missions currently managed by Goddard is impressive, but does not adequately demonstrate the uniqueness of the GSFC FPPD capabilities. The ability to provide leadership is vital; the ability to manage gets the job done. Effective management depends on having the right people, providing them with the right resources/tools, having validated processes/procedures and creating a culture of excellence, accountability and ownership; we clearly satisfy each of these requirements. We utilize an integrated approach – scientists, engineering, safety and mission assurance and mission management – to enable us to take on and accomplish the most challenging of assignments. The overarching principle of the FPPD: define the problem that needs to be solved, and demonstrate that the course of action being pursued contributes directly to the solution. This story resonates with our constituent communities, and I hope each of you can see how your extraordinary efforts play the key enabling roles for its' accomplishment.

Rick

PERSONALITY TINTYPE

John Loiacono

John is the Capture Manager for the Extra-solar Planetary Imaging Coronagraph (EPIC) Proposal that will be submitted in response to the Discovery Announcement of Opportunity - 12. He joined Code 400 in 1998 as the Instrument Systems Manager for EOS-Aura, and later was appointed the Deputy Project Manager/Technical for EOS-Aura. In his 21 years at GSFC, he has worked in Codes 400, 600, (old) 700, and 900. He was selected into the first PMDE technical class in 1990.

Born: Manhattan, New York

Education: Bachelor of Electrical Engineering, The Catholic University of America. Coursework in Master's of Electrical Engineering and Master's of Engineering Management.

Life at GSFC: John was hired at GSFC into the Laboratory for Atmospheres, Code 915, as a design engineer on the Galileo Neutral Mass Spectrometer Instrument in 1984. That was when the science branches/Principle Investigators had "mini Goddards" working in their labs, with all engineering and technician disciplines represented. After Galileo, John began working on Cassini, but when the mission was delayed, he was selected as the Instrument Manager for the Russian Meteor-3/TOMS project. With the amount of travel required, John suspended his pursuit of a Masters in Electrical Engineering Program at University of Maryland for some valuable experience on TOMS.

The Meteor-3/TOMS project was organized as a skunk works project, and launched exactly on-time, August 15, 1991. As John and his small team were getting ready to send the commands to begin instrument operations, the USSR experienced a Coup on August 18. He was in Moscow, a few miles from Red Square as it unfolded. When the US Embassy told him to get out on the next plane, his team secured flights the next day. There were a lot of lessons learned

(Loiacono Tintype Continued on page 31)

Linnette Morales

Linnette started at NASA Goddard Space Flight Center as a Summer Intern in 2002 where she worked for the STP and LWS Programs doing Data Cleanup. She returned under the CO-OP Program in January 2003 and worked as a Resources Analyst Student Trainee for the STEREO project. She finally became a full time employee and joined the STEREO team as a Resources Analyst in November 2003.

Born: San Juan, Puerto Rico on June 4, 1981.

Education: Graduated Summa Cum Laude from the University of Puerto Rico, Río Piedras Campus in June 2003. She completed a Bachelor in Business Administration with a dual major in Accounting and Finance. Linnette is a Certified Public Accountant and she obtained the second highest score on the test offered in Puerto Rico in November 2003. She is a CPA for the Commonwealth of Puerto Rico and in the state of Maryland. She is going to start her Masters in Business Administration (MBA) at John Hopkins University this fall.

Work life: Linnette has been actively involved in other activities outside her duties as an RA. She became Co-Chair for the New Employee Welcoming Board (NEWB). NEWB is a group of new employees across the center that has been at GSFC for less than five years dedicated to helping new employees. It was started in Code 500 and grew to become a center wide committee. She received a Special Act Award for her leadership in creating the NEWB and in generating a first rate set of products and services that not only have fulfilled a pressing need for AETD, but have also done so for the Center. She also participated as a Track Coordinator at the first and second Annual Project Management Challenge Conferences.

Family: Currently lives in Severn, MD. She is the youngest of four children, having two brothers and one sister. She also has two nieces, Brenda and Bianca, whom she adores. Her parents along with her siblings and nieces all live in Puerto Rico.

Life outside of Work: When not at work you can find Linnette either at the movies or probably salsa dancing and spending time with her friends

FEEDBACK

GSFC Resident Office at KSC

- On July 26, 2005 we experienced a magnificent lift-off of Discovery on its "Return to Flight". All systems on STS-114 were set to go, and the weather couldn't have been better. This was the second time in the shuttle's 24 year history that a Discovery launch restarted the program after a disaster. The twelve day mission got off to a smooth start. All launch events were filmed by 110 cameras and sensors on the ground, aboard aircraft and on the shuttle. Engineers studied all of these videos and monitored all phases of this flight. A malfunctioning fuel sensor that scrubbed the earlier launch date performed perfectly. Discovery had a successful mission, however, due to weather Discovery had to land at Edward Air Force Base, California on August 9, 2005. The shuttle returned to KSC on the back of a Boeing 747 Shuttle Carrier Aircraft. After thoroughly examining the videos of the launch of STS-114, shuttles were grounded until the External Tank (ET) insulating foam problem can be solved. Atlantis was the next scheduled orbiter to fly to the Space Station, but the decision has been made that Discovery will make the next flight.
- Several STEREO payload teams have scheduled classes at Cape Canaveral Air Force Station (CCAFS) for the special training required for their particular payload processing. Mainly this consisted of Air Force sponsored classes pertaining to escorting Foreign Nationals. All Foreign Nationals will be escorted at all times

(FeedBack Continued on page 23)

Policy and Standards Office
An Open Letter to the Community

Someone is asking questions:

What are the current Earned Value Management (EVM) documents that go into a request for proposal?

Will we ever move beyond the latest Integrated Enterprise Management (IEM) training?

What is a “Clean Opinion” on our Agency financial statements and why does that matter?

What is a Cost Analysis Data Requirement (CADRe) and who has to do one?

These are all questions on the minds of the GSFC Resources and Finance (R&F) community and the folks they support. They are also questions which the new Policy and Standards Office is seeking to help our CFO and GSFC management answer.

This Office was established in February 2005 within the Office of Chief Financial Officer. Despite its name, this Office does not so much make new policy or standards as much as help to interpret the flowdown of Agency policy, carry common messages to HQ, and improve the use and application of Center processes, systems and standards as this community goes about its business. To date, our primary role has probably been in the form of an in-house consultant. Formally, the Office is responsible to the CFO and the R&F community for:

- Financial and Resources Management Policy
- Career development and training
- Earned Value Management
- Cost estimating
- General support to IEM and business systems and processes
- Improving communications (including websites) for the above

So who is this R&F community? After simple summation of the pure financial and resources job series where accountants and resources analysts reside, you must wade into some of our program management series to find some of our other positions such as Deputy Program Business Managers. Our initial count with OHR Code 112 and after checking with Directorate Resources Managers came to 318, more than 10% of GSFC Civil Servants! And to do our job we will also address some of the needs of the important on-site contractors who support these folks.

Matt Ritsko, a new Intern, who helped assemble this database said it best: “When making decisions and providing services to the R&F community, we need to understand who these peo-

(Policy & Standards Continued on page 5)

(Policy & Standards Continued from page 4)

ple are and how they might be affected."

So what has the P&S Office office been up to? Since February, we have been tackling a diverse set of activities. Some highlights:

- Hired leads for Career Development (Kellie Behrle) and EVM (Vanessa Johnson);
- Established an undergraduate Intern program at GSFC and hired five new resources interns that are rotating across GSFC for the next two years;
- Surveyed 20 NASA websites and 15,000+ documents to start on an R&F document tree and on how to consolidate our OCFO websites;
- Conducted a GS-13 Resources Analyst panel to work for consistency for OHR Code 113 to classify these positions;
- Supported Agency level processes to modify and translate EVM policy into practical terms for in-house and out-of-house efforts (definitely still in process). Began guiding and conducting EVM Integrated Baseline Reviews;
- Pressed NASA HQ to get a better interpretation of what a Cost Analysis Data Requirements (CADRe) document is and to explain why a busy Project should take the time to fill one out (still in discussions on this one);
- Began partnering with OHR on many activities, including their management of an IEM "sustainment" training which comes after IEM module rollout and for which Code 114 is conducting an upcoming formal needs assessment;
- Supported an Agency-level team and initiated several Center focus group discussions to drive Project Management requirements into future IEM and business system builds;
- Started development of a communication strategy and its implementation to respond to the results of the Communications Tiger Team and some internal OCFO culture change activities;
- Began an outreach effort across GSFC to find out what your issues and priorities are including a visit to the Sun-Earth Connection Resources Retreat (Code 460) in early October.

In these endeavors, we are a small office (6 people now) and necessarily leverage off and support organizations who make the "product" at GSFC (e.g. Codes 400, 500, 600, etc.), and offices who own the functional processes (e.g. other parts of the OCFO, Procurement, OHR, Mission Success, New Opportunities, etc.).

Laura Cochran (OHR, Code 114) expressed the importance of working across organizations in a recent note to her new management: "Jonathan, Denise *(Denise Davis from the IEM Project)* and I have been meeting regularly for months to determine an effective approach to IEM sustainment training. Now we've added Viki Abiba (114) and Kellie Behrle (150), too. We are very purposeful in making sure we are aligned in our intent, actions, and message."

(Policy & Standards Continued on page 15)

Exploring Diversity through Art

Employees who stopped by the Building 1 Training Facility on Friday, September 23rd, witnessed one of the classrooms transformed into an elegant art gallery featuring the work of professional artists Ms. Leslie Berns, Ms. Barbara Blanco, Dr. Nicole Cutts and Dr. Barbara Hardaway. Those who came in and stayed awhile surely enjoyed a rich experience exploring the diversity of the artistic expression on display. The Flight Programs and Projects Directorate Diversity Council offered this art showcase as a unique and pleasurable diversity learning experience.

The inspiration for this event was born out of the idea that diversity is intrinsic in art. Through their artwork, artists not only present their talents and training, but also draw on their myriad experiences and influences to create in physical form the images that take shape in their hearts and minds. Each original piece of artwork is a creation that hasn't existed before and provides those that view it with a new experience. Diversity in art can have the effect of building bridges and spreading awareness.

Leslie Berns earned a Master's in Fine Art from the Yale School of Art and Architecture and a Bachelor's in Fine Art from Pratt Institute where she studied painting and sculpture. Ms. Berns has exhibited drawings, paintings, site-specific sculptures, performances and public artworks in the United States and Europe. Throughout her development as an artist, she has drawn inspiration and insight from a rural Jamaican heritage, transplanted to urban America. In her work Ms. Berns explores the terrain where Nature becomes an expression of Culture. The results are consistently a rich, expressive meditation on the relationship between self/world, feminine/masculine, black/white, chaos/order and form/content.

Barbara Blanco, a self-taught artist, incorporates photography and painting, two mediums that inspire her. Her work reflects and expresses her observations of life. She does not plan the image, but instead allows herself to be in the moment as it occurs. Ms. Blanco created Different Eyes Photography Club, an after-school program to teach local elementary school children to observe and appreciate the world around them using the art of photography as the inspiration. As a teacher, she encourages children to see the world through different eyes. Ms. Blanco is deeply committed to documenting life and architecture. She explores the juxtaposition of people and buildings and strives to capture the tension between what's static and what's dynamic—seeking that AHA! moment.

Nicole Cutts, Ph.D., is an artist, psychologist, teacher, and author of travel and psychological articles. She studied at The Corcoran School of Art and Howard University. After college, she decided to pursue a doctorate in clinical psychology. Her abstract series, *Gemini Visions*, was spawned from inspiration received in a dream. The works in this series combine Adinkra symbols from Ghana, Chinese characters and natural elements. Dr. Cutts uses her artwork to educate herself and others about diverse cultures, and through the process, deepens her own self awareness. She also paints landscapes that invite you into her magical world where sunlight and water abound. Her favorite subjects are seascapes, characterized by brilliant color and sharp detail. Her love of the sea has led her to the shores of Maryland, the Red Sea, the Bahamas, Anguilla, Barbados, and back to her mother's homeland of Jamaica.

Barbara Hardaway, Ph.D., is a graduate of Howard University and a collage artist who has her own studio in Silver Spring, Maryland. She is also an English professor at Gallaudet University in Washington, D.C. Since 1989, Dr. Hardaway has focused on mixed-medium collages and assemblages, experimenting with various design elements, computer technology and adhesive applications. She has exhibited in galleries throughout the Washington metropolitan area, including the Martin Luther King Jr. Library, the Strathmore Hall Arts Center and the Corcoran Gallery of Art. Her work is in private homes of collectors

(Diversity Continued on page 7)

(Diversity Continued from page 6)

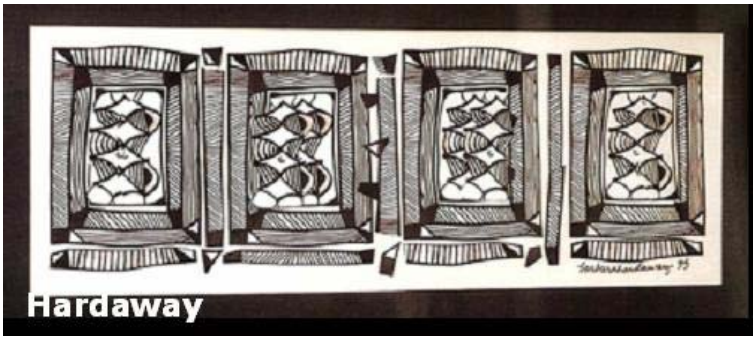
in New Zealand, West Africa, Europe and throughout the U.S. She has been featured on Channel 9 News and several Montgomery County Cable television programs.

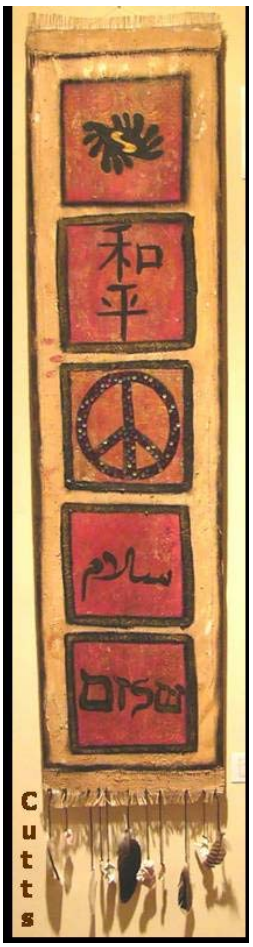
Charla Puryear, professional painter and sculptor, played a vital role in turning the idea of exploring diversity through art into the reality of this event. She participated in brain-storming sessions on the subject, helped plan the flow of the day and contributed her artistic assistance in creating the event's poster. Though unable to participate in person due to her recent move to California, the event benefited greatly from her behind-the-scenes contributions.

Those who participated in the lunchtime panel discussion heard the artists share their thoughts on what diversity means to them as expressed through their art. Ms. Berns, who through her work compels us to contemplate the delicate balance between the natural world and the world of human cultural constructs, propounded the question of why many people easily appreciate the value of biodiversity yet are skeptical of the value of human diversity. Ms. Blanco discussed the challenges of embarking on an art career and some of the particular challenges minority artists face seeking appreciation for their work beyond the confines of ethnocentric expression. Dr. Cutts spoke about how she uses her art to explore other cultures and actively looks for similarities as well as differences in the symbols used by various cultures. Dr. Hardaway presented the universality of art as the flip side of diversity and shared how her work, which personally reflects her own experience, is embraced by people of many different backgrounds as expressing something from their own personal experiences.

The FPPD Diversity Council sought to offer a diversity activity that would be fun, interesting and uplifting

(Diversity Continued on page 18)





Technology Corner

Goddard to Restore Robotics Capability Identifies Complementary Niche Areas

Goddard technologists have developed a plan to restore the Center's competency and organization in the burgeoning field of robotics, focusing on specific areas that would benefit NASA's Vision for Space Exploration and science applications.

The thrust for Goddard will be in technologies that allow robots to interact more safely with one another and with humans, particularly where neither has complete control over the environment — often referred to as an "unstructured environment," said Ted Swanson, Assistant Chief for Technology in the Mechanical Systems Division, and a member of the Robotics Formulation Team that developed the plan. This effort is distinct from the possible robotic development work by the Hubble Servicing Mission, he added.

"There's clearly a role for us that's complementary to what Johnson Space Center and the Jet Propulsion Lab are doing," Swanson said. "We have to be aggressively moving in that direction."

Goddard employees organized the Robotics Formulation Team in November 2004 to reinvigorate robotics research at Goddard. Goddard abandoned robotics research about 15 years ago when NASA Headquarters decided that the work did not directly benefit Goddard missions. However, the Center has carved out a leadership role in the area of on-orbit repair and maintenance primarily because of its work with the Hubble Space Telescope.

Four Specialty Areas Pursued

The plan is to use that expertise and expand into four areas — in-space assembly of large telescopes and instruments; in-space servicing, maintenance, and repair of science satellites (similar to work done under the Hubble program); in-space assembly and docking of large space structures; and in-space and extraterrestrial assembly and operation of equipment and experiments for scientific testing, in-situ resource exploration and use, and possibly operation of nuclear power sources.

To carry out these activities, the Center will have to develop specialized technologies that allow robots to work with one another and with humans in situations where both must react to the unexpected — unlike on assembly lines, for example, where the robot is programmed to carry out a specific task under set conditions.

Other technology goals include developing advanced animation and simulation capabilities, robotic tools and end-effectors, highly adaptive thermal control, vision systems, contact dynamic

Technology Corner

analysis, and high-performance signal processing and data handling. Goddard also hopes to enhance system modularity through its revitalized robotics technology-development efforts.

The effort looks promising, Swanson said. In fiscal 2005, six robotics projects are being funded through the Internal Research and Development program and two under the Director's Discretionary Fund. Altogether, Goddard has invested about $2.5 million in this research. In addition, the Robotics Formulation Team has identified several potential partners and plans to begin discussions with the science missions to determine whether any could be enhanced through advanced robotics.

Contact: Ted Swanson
Phone: 301-286-7854
E-mail: Theodore.D.Swanson@nasa.gov

Projects Receiving FY 2005 Research Funding

The following projects received research funding under the Internal Research and Development (IRAD) program and the Director's Discretionary Fund (DDF) in FY 2005:

IRAD

In-space Robotic Integration System (IRIS), Principal Investigator Yury Flom, Code 541

Reconfigurable Tetrahedral-based Robotic System, Principal Investigator Steven Curtis, Code 695

Development of a Novel Six Degree-of-Freedom (DOF) High-Precision Alignment Robot, Principal Investigator Farhad Tahmasebi, Code 544

Tactile Tele-Sensing, Principal Investigator Kate Hale, Code 544, and Ryan Boller, Code 587

Conformal Gripping Systems, Principal Investigator John M. Vranish, Code 544

Intelligent, Optimized Thermal Control for Robotic Systems, Principal Investigator Jeffrey Didion, Code 545

DDF

Virtual Feel Robotic Assembly, Principal Investigator John Vranish, Code 544

Development of a Novel High-Precision Three DOF Tip-Tilt-Piston Alignment Robot, Principal Investigator Farhad Tahmasebi, Code 544.

(NOAA-N Continued from page 1)

will provide a demonstration of four instruments for the first NPOESS mission.

The NOAA-N satellite includes several changes over the previous KLM series of satellites. Modifications were required to accommodate the change from a Titan II to the Delta II launch vehicle. The Apogee Kick Motor (AKM) was deleted and the propulsion subsystem was simplified. Flight software was revised to provide a new deployment scenario and the structure and harnesses were modified. A new instrument, the Microwave Humidity Sounder (MHS), was substituted for the AMSU-B and several other instruments were improved. On the spacecraft all recorders were changed to solid state technology, a new Inertial Measurement System (IMS) uses ring-laser gyro technology, the S-band transmitters were substantially improved, and other minor upgrades were incorporated.

The launch vehicle was a Delta II 7320-10. This configuration consists of a Boeing Rocketdyne RS-27A main engine, three thrust augmentation graphite epoxy motors (GEMs) built by Alliant Techsystems, and a second stage Aerojet AF10-118K liquid propellant engine. The satellite was mated to the launch vehicle on April 19 with a scheduled launch date of May 11, 2005. After a few delays, on May 20 the Delta lifted off beautifully from the VAFB site lighting the SLC-2W pad as it ascended into the dark of night. All engines performed flawlessly as the vehicle and satellite fired toward the initial transfer orbit. After approximately 50 minutes of barbecue mode, the vehicle re-aligned along track for the final second stage burn. Then it performed a 90 degree yaw maneuver and initiated separation of the satellite. A near perfect sun-synchronous orbit was

NOAA-N In The Delta II Fairing

NOAA-N Delta II Liftoff On May 20, 2005

(NOAA-N Continued on page 11)

(NOAA-N Continued from page 10)

NOAA-18 On Orbit Configuration

achieved with a semi-major axis of 7239.49 km, inclination of 98.74^0, and ascending equator crossing of 2:00 p.m. local sun time.

Once on orbit, the satellite designation was changed to NOAA-18. NOAA-18 was built by Lockheed Martin Space Systems Company (LMSSC) in Sunnyvale, California. This spacecraft will continue to provide a polar-orbiting platform to support: (1) environmental monitoring instruments for imaging and measuring the Earth's atmosphere, its surface and cloud cover, including Earth radiation, atmospheric ozone, aerosol distribution, sea surface temperature, vertical temperature and water profiles in the troposphere and stratosphere; (2) measurement of proton and electron flux at orbit altitude; (3) data collection from remote platforms; and (4) the Search and Rescue Satellite-Aided Tracking (SARSAT) system. Additionally, NOAA-18 is the fourth in the series to support dedicated microwave instruments for the generation of temperature, moisture, surface, and hydrological products in cloudy regions where visible and infrared (IR) instruments have decreased capability.

The NOAA-18 primary instruments—the Advanced Very High Resolution Radiometer (AVHRR/3), High Resolution Infrared Radiation Sounder (HIRS/4), and the Advanced Microwave Sounding Unit (AMSU-A)—have all been designed for a three-year mission. Additional instruments include the Solar Backscatter Ultra-violet Radiometer (SBUV/2) designed for a two-year mission, and the Microwave Humidity Sounder (MHS) designed for a five-year mission to meet requirements of the Metop program in Europe. The instrument complement also includes the Space Environment

(NOAA-N Continued on page 12)

(NOAA-N Continued from page 11)

Monitor (SEM/3), the Data Collection System (DCS/2), and two Search and Rescue instruments—the Search and Rescue Repeater (SARR/2), and the Search and Rescue Processor (SARP/2).

The AVHRR/3 instrument provided by ITT is a six-channel imaging radiometer that detects energy in the visible and IR portions of the electromagnetic spectrum. The instrument measures reflected solar (visible and near-IR) energy and radiated thermal energy from land, sea, clouds and the intervening atmosphere. The instrument has an instantaneous field of view (IFOV) of 1.3 milliradians, providing a nominal spatial resolution of 1.1 km at nadir. The cross-track scan of the Earth provides a view of +/-55.4^0 from nadir.

The HIRS/4 instrument also provided by ITT is an atmospheric sounding instrument that provides multispectral data from one visible channel, seven shortwave channels, and 12 longwave channels using a single telescope and a rotating filter wheel containing 20 individual spectral filters. The IFOV for each channel is approximately 0.7^0 that encompasses a circular area of 10 km diameter at nadir. The previous instrument had a 20 km view. An elliptical scan mirror provides a cross-track scan of 56 steps at 1.8^0 each. Data is used, in conjunction with the AMSU instruments, to calculate the atmosphere's vertical temperature profile from the Earth's surface to about 40 km altitude.

The AMSU-A provided by Northrop Grumman Electronic Systems measures scene radiance in the microwave spectrum. It is a cross-track scanning total power radiometer that is divided into two separate modules. The instrument has an IFOV of 3.3^0 at the half-power points providing a nominal spatial resolution of 48 km. The data is used to provide precipitation and surface measurements including snow cover, sea ice concentration, and soil moisture.

The MHS provided by EADS Astrium Ltd via EUMETSAT is a new instrument for the NOAA series of satellites. It is a five-channel microwave instrument intended primarily to measure profiles of atmospheric humidity. It measures cloud liquid water content and provides qualitative estimates of the precipitation rate. The instrument has a 16-km diameter circular field of view and scans at three times the rate of the AMSU's, i.e. 3 times in 8 seconds.

The SBUV/2 provided by Ball Aerospace is a nadir-pointing, nonspacial, spectrally scanning, ultraviolet radiometer carried in two modules. The sensor module has an overall spectral resolution of approximately 1 nanometer (nm). The sensor module includes a monochrometer that measures the Earth radiance directly and the Sun selectively with a deployed diffuser, and a Cloud Cover Radiometer (CCR) whose output represents the amount of cloud cover in a scene. It is used to remove cloud effects in the monochrometer data. The instrument data is used to assess global ozone concentration in the stratosphere and the vertical distribution of atmospheric ozone to an absolute accuracy of 5%.

The SEM/3 provided by the Assurance Technology Corporation (ATC), formerly GE/Panametrics, provides measurements to determine the intensity of the Earth's radiation belts and the flux of charged particles at satellite altitude. The SEM consists of two sensors. The Total Energy Detec-

(NOAA-N Continued on page 13)

(NOAA-N Continued from page 12)

tor (TED) senses and quantifies intensity in the sequentially selected energy bands (0.5-20 keV), and the Medium Energy Proton and Electron Detector (MEPED) senses protons, electrons, and ions with energies from 30 keV to levels exceeding 6.9 MeV.

The DCS/2 provided by Thales via CNES/France supports a wide variety of data collection platforms dedicated to environmental study and protection. The platforms consist mainly of drifting and moored buoys, sub-surface floats, remote weather stations that serve meteorological and oceanographic applications, fishing vessels for fishing resource management, and tracking animals for biological and species protection purposes. The platforms relay data such as atmospheric pressure, sea surface temperature and salinity, ocean currents, sea and river levels, and animal temperature and activity. The data is relayed by NOAA to processing centers in Largo, Maryland, and Toulouse, France for processing and dissemination.

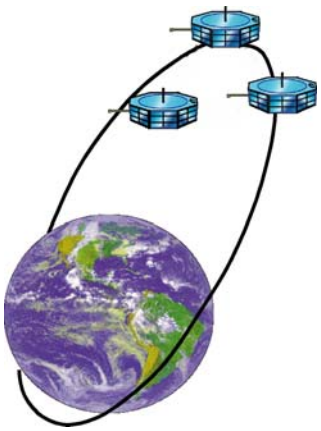
The two SAR instruments, the SARR/2 provided by EMS in Canada, and the SARP/2 provided by Thales via CNES/France, are part of the international COSPAS-SARSAT system designed to detect and locate Emergency Locator Transmitters (ELTs), Emergency Position-Indication Radio Beacons (EPIRBs), and Personal Location Beacons (PLBs). Location using the SARR instrument requires simultaneous view of a beacon and a Local Users Terminal (LUT) by the satellite while the SARP provides real time and global stored capability for beacon location. The LUT forwards location information to a corresponding Mission Control Center (MCC) that, after further processing, forwards the information to an appropriate Rescue Coordination Center (RCC) that effects search and rescue.

The Satellite Operations Control Center (SOCC) in Suitland, Maryland, is provided by the NOAA National Environmental Satellite, Date, and Information Service (NESDIS). Numerous assets were utilized to provide Command and Data Acquisition (CDA) links with the new satellite. For the ascent, separation, and handover to orbit phases of the mission, the Tracking and Data Relay Satellite (TDRSS) provided real time telemetry on a best effort basis from the S-band omni-directional link on the satellite. On orbit, NOAA provides its own CDA sites at Fairbanks, Alaska, Wallops Island, Virginia, and Point Barrow, Alaska. For the very early phases of the mission, ground site support was provided by the Jet Propulsion Lab (JPL) DSN sites in Madrid, Goldstone, and Canberra. The AFSCN provided support from the sites in Oakhanger, England, and Thule, Greenland. Throughout the checkout period, the NASA operated site at McMurdo Sound, Antarctica was used.

The satellite checkout period began with the first Fairbanks contact after Delta separation. Additional resources and personnel augment the NOAA personnel at the SOCC during the first five days in orbit. Lockheed Martin, NASA, NOAA, and various contractors provide around the clock monitoring of the satellite to ensure performance of the primary spacecraft subsystems is nominal. A detailed On-orbit Verification Plan structured into a contact by contact Flight Time Table (FTT) is executed to establish subsystem and instrument activation and performance baselines on orbit. By agreement between NASA and NOAA in a Memo of Understanding (MOU), NASA retains responsibility for health and safety of the satellite until 21 days after launch. The satellite is then handed over to NOAA for routine monitoring while

(NOAA-N Continued on page 24)

Goddard Team Pushes Technology



Have you ever noticed how some things just keep getting smaller and smaller? Take for example our cell phones or personal computers. Just a few years ago it would have been impossible to conveniently tuck a cell phone away in a pocket or carry around a computer that weighs less than 5 lbs. Well, Goddard's Space Technology 5 (ST5) Project/Code 495 is building and testing that miniaturization concept with three small satellites.

These satellites, also known as micro-sats, will test and validate new technologies and aid scientists in understanding the harsh environment of the Earth's magnetosphere. Building and testing of all three micro-sats is underway in the Building 29 complex.

The first of the three micro-sats has successfully completed all environmental testing and is supporting operational training. Environmental testing of micro-sat two and three is underway with thermal vacuum testing scheduled to begin in August.

Miniaturized components and technologies are being integrated in to each of the micro-sats. Each micro-sat weighs approximately 25 kilograms (55 pounds) when fully fueled and resemble a very large birthday cake at 53 centimeters (20.7 inches) across and 48 centimeters (18.7 inches) high. The three ST5 spacecraft will be launched using a Pegasus XL rocket and spun into a near-Earth polar elliptical orbit approximately 300 kilometers (190 miles) X 4,500 kilometers (2,800 miles).

On schedule to launch from Vandenberg Air Force Base (VAFB) in late February 2006, ST5 has a mission duration of 90 days.

Although small in size compared to their counterparts, each of these satellites is considered "full service," meaning they contain avionics with capabilities comparable to what is seen on spacecraft that are much larger. Each ST5 micro-sat will validate New Millennium Program (NMP) technologies such as the Cold Gas Mirco-Thruster (CGMT), X-Band Transponder Communication System, Variable Emittance Coatings for Thermal Control, and CMOS Ultra-Low Power Radiation Tolerant (CULPRiT) Logic.

Another feature resulting from the miniaturized size and reduced weight is the ability to launch multiple micro-sats from a low-cost Pegasus XL rocket. The ST5 Project designed, fabricated and tested a new innovative Pegasus launch rack that supports three micro-sats in a "stacked" configuration. By utilizing this type of multi-rack design, each micro-sat will be individually deployed in a spinning (Frisbee-like) motion.

After deployment, each of the micro-sats will be positioned in a "string of pearls" constellation that demonstrates the ability to spatially configure each micro-sat to perform simultaneous multi-point measurements of the magnetic field using a highly sensitive magnetometer. Using data collected from the ST5 constellation, scientists can begin to understand and map the intensity and direction of the magnetic field, its relation to space weather events and the effects on our planet. With the help of pathfinder missions such as ST5, NASA hopes that in the future, scientists will be able to accurately forecast space weather and thereby minimize its

(Goddard Team Continued on page 15)

(Goddard Team Continued from page 14)

harmful effects on space and ground based systems.

The ST5 Project is an instrumental part of New Millenium Program (NMP). NMP was created to identify, develop, build, and test innovative technologies and concepts for infusion into future missions. To determine the future capabilities needed, NMP is guided by NASA's Earth and Space Science "roadmaps." These roadmaps lay out the path of future scientific enquiry. They serve not only as a vital guide for NMP's selection of technologies, but are used to conceive and design the program's test missions as well.

Small, inexpensive, yet highly capable micro-sats are instrumental in the validation of new miniaturized components that will help pave the way for flying tens to hundreds of micro-sats in future missions.

For more information on ST5:
http://nmp.jpl.nasa.gov/st5/

For educational activities:
http://spaceplace.nasa.gov

By Nancy Leon and Lynn Chandler
(Goddard View)

(Policy & Standards Continued from page 5)

Okay, by now this sounds like a commercial, but we really wanted to provide some examples and lay the foundation for a request for further dialogue and discussion. We need to hear from you whether you are an R&F person, supported by an R&F person, have our community as a customer, or have some other relationship to this community.

We do worry some about overpromising to fix your daily issues, diving in too deep on an issue or area, and possibly conflicting with instead of complementing Agency and Center initiatives in other functional areas. But there are so many ways to go on this adventure that we need you to point out the key issues and systems needs and help us prioritize with Nancy Abell and Resources Forum participants. Any comments and suggestions are welcome. You may always call or e-mail me (301)286-8330, Jonathan.G.Bryson@nasa.gov). Or we may be coming to you soon about websites, career development and other topics and would appreciate if you can take a moment from your busy jobs and lives to tell us what's on your mind.

From our cross-cutting review of our R&F community to date, it is simply awesome to see what happens here at NASA and GSFC every day. Thank you for everything you do to help GSFC meet its mission and for the opportunity to work on the humbling task of trying to help you and our community to do it better or more easily.

Jonathan Bryson, Chief
Policy and Standards Office (Code 150)

Robotic Explorers for Antarctic and Lunar (REAL) Applications

There's a lot of talk around Goddard about robotics, (see article on page 8) and how we need to develop a competitive capability in the near future. There's also a lot of talk about how we don't have funded projects or charge numbers to work on robotic projects outside the very limited, Research and Develop (R&D) world. So, what do we do while we're waiting for something REAL to come along?

Well one of the guys in Code 400 has taken some interesting initiatives. Mike Comberiate is a Senior System Engineer working directly for Rick Obenschain. He's developing the Robotic Explorers for Antarctic and Lunar (REAL) applications program and it's starting to get some attention Centerwide. With a small amount of GSFC funding to organize a new robotics program, he has been leveraging a partnership with Michigan State University (MSU) to provide technical manpower. Since last year 34 seniors in Electrical, Computer Engineering, or Computer Science have worked on his NASA robotics projects. Each student receives 5 mandatory academic credits towards graduation for their work on these projects. Mike says that the trick is to make each project build on the previous efforts, so that eventually you have a very complex product that could actually be very useful to Goddard. In this past year we've designed and built a robotic test vehicle that can be operated tele-robotically or autonomously. It is a prototype for a vehicle that could be used to deploy and communicate with instrumentation in remote or hostile environments. However, its main function is to be a test bed for transferable technologies that would be necessary in a multitude of robotic applications on our anticipated Exploration missions. In January, 2005 with some support from the HST Robotic Servicing Mission, we took it to Antarctica and conducted a Hubble-like robotic docking maneuver by remote control via the Internet.

This summer four of the students, who just graduated from MSU, had become so attached to their parts of the accredited REAL projects during their senior year, that they have been spending their summer here at GSFC. They're taking the robot to the next level with a vision-navigation and obstacle avoidance subsystem and several major improvements to the current autonomous vehicle. This team forms the nucleus of a group of nine college interns working with Mike in bldg 16W, room N66.

Interns and Michael Comberiate

NASA is chartered to inspire the next generation of explorers to follow in our footsteps, but this crew has driven that goal to a whole new level.

(Robotic Continued on page 17)

(Robotic Continued from page 16)

They've adopted the robotic explorer project as their own. They work as a team patterned after what we all did back in the early days at Goddard. They work long hours sometimes to midnight, tearing the Bot apart and rebuilding it better with more complex control software and more sensors fused into its CPU. They strive to put on demonstrations that sometimes fail, but they fall back, fix it, and try again. "It's reminiscent of the old days when we were allowed to fail and fix, without getting the bad press", says Mike. " It's actually a fantastic way to learn, and it inspires teamwork. When you look over your shoulder and you see the other guys knocking their lights out trying to solve a problem, how can you let yourself slack off?"

Derek Sokloski, BSEE says that, "What we have here is an opportunity to experience the thrill of reaching for the stars as part of the NASA team… We've met some of the NASA pioneers and listened to their stories of the glory days when no one knew if it really could be done. And now, here we are with our own set of challenges working in this emerging, new area of robotics. It's "Awesome".

Steve Nann, BSCpE says, " We were able to bring our senior design project into the real world and perfect it on the MERS terrain. We learned about other related technologies from the engineers at Goddard and experienced the working environment as though we were full-time employees. I'm ready for a career here at NASA. I want to start today!"

"The part I think is most Impressive," says Mike, "is that this group formed a team with various technical skills and they have been functioning just like one of our technical project teams. They have some ultimate goals that I give them as the Project Manager, but they break down the work into design, development, integration, testing, documentation, and presentation components. They each take on parts of the greater task and work closely together throughout the development. They are truly a technical group by themselves. And, because they are applying some of the latest developments in software and hardware they are able to produce results normally expected only from a long-standing technical team. Just like Microsoft and Google, as new technologies emerge, the success paradigm shifts. All we need to do now is to absorb them into Goddard as part of whatever robotics section we hope to develop here."

Gary Crum, BSCpE is the technical lead for this group and he has captured the essence of the technical challenges involved in this very extensive ongoing effort. "Our test vehicle has a single board 133MHz processor with 64MB of RAM and a 512MB Compact Flash memory. We talk to it via a wireless link where we can operate it with a joystick or direct it to operate autonomously. We've designed and built all the power regulation and distribution hardware and custom-built the structure. We've improved the motor controllers for driving the vehicle and upgraded the command and data handling, and image processing software significantly. We've replaced the wheels with tank treads for better performance on the Multipurpose Exo-terrain for Robotic Studies (MERS), and added an Inclinometer, Compass, GPS, Camera, Sonar, and Infrared Detectors."

(Robotic Continued on page 26)

(Diversity Continued from page 7)

for Goddard employees. Based on the positive feedback from the many participants, this event was an unequivocal success! People started to show up as soon as the exhibit opened and there was a steady stream of folks throughout the day. Many who came lingered, engaged in thought-provoking discussions with the artists and came back later in the day with friends. This enlightening exhibition concluded with an Artists Reception where participants immersed themselves in the beautiful art work, mingled with each other and the artists, and enjoyed delectable wine and cheese.

Interested in learning more about the event or the artists? Contact Andrea I. Razzaghi (andrea.i.razzaghi@nasa.gov) or Sharon M. Garrison (sharon.m.garrison@nasa.gov).

Andrea Razzaghi, Code 410
Sharon Garrison, Code 408

Test Your Project Management Knowledge!

(True or False)

1. Free Slack, Total Slack, Project Slack and Schedule Reserve all mean the same thing. ____ True ____ False

2. If the Estimate at Completion (EAC) for a task is less than its Actual Cost (AC) to date, the difference is known as an overrun. ____ True ____ False

3. Once an Over Target Baseline (OTB) has been established, the contract should be modified to set the contract value equal to the OTB. ____ True ____ False

4. According to NPR 7120.5C, when a project's projected cost or schedule performance exceeds the NAR Baseline by 10%, a continuation or termination plan must be provided to the GPMC. ____ True ____ False

5. A Schedule Performance Index (SPI) of .38 means that for every dollar of work planned, 38 cents of work was accomplished. ____ True ____ False

6. If Activity A has two Finish-to-Start (FS) predecessor activities, it is more likely to finish later than it would if it only had one FS predecessor activity.
True ____ False ____

See page 28 for part II

Comings & Goings

Comings:

- Cassandra Scott joins 429/NPP Project Resource Analyst
- Hongwoo Park joins 429/NPP Instrument Systems Manager
- Sharon Purser joins 400.1/Associate Director Business Management Office Mission Business Manager
- Vanessa Hernandez-Martinez joins 430/RLEP Student Trainee (Resources) (Co-op)
- Cathleen Richardson (RTD) joins 417/GOES-R Instrument Manager
- Tom Dixon joins 417/GOES-R Instrument Manager
- Rebecca Knoble joins 480/POES Project Resource Analyst
- Jonathan Root joins 408/ACTO Project

Goings:

- Laurey Adkison from 455/MARS Laser Communication Project Financial Manager to 170/Independent Technical Authority Governance and Systems Management Office
- Rosemay Bruner retires from 450/Space Communications
- Valda Jones from 441/HST Operations Project Mission Business Manager to 150/Office of the Chief Financial Officer
- Wynn Watson from 441/HST Operations to 100/Office of the Director
- Gene Martin-Guerrero resigns from 417/GOES-R Instrument Manager
- Gibran McDonald – Co-op Conversion to FTP – HST Operations Project Resource Analyst
- Larry Phillips from 451/Customer Commitments Project Office to 592/Systems Engineering Services and Advanced Concepts Branch
- Rick Pickering resigns from 424/AURA Project Manager
- Oren Sheinman from 410/Explorers to 543
- Jim Head retires from 420/EOS Program Analyst
- Kellie Behrle from 403/FPPD Business Office to 150/ Office of the Chief Financial Officer
- Ken Ford resigns from 461/STP Program
- Debbie Sharp realigned to Code 700
- Ron Ticker from 440/HST/TPF Formulation Manager to NASA Headquarters
- Madeline Barron from 420/EOS Program Resource Analyst to 603
- Elaine Blazosky retires from 463/STEREO Project Financial Manager
- David Littman from 480/POES to 590
- Lourdes Martinez-Wisniewski from 480/POES Resource Analyst to 500
- Donna Montgomery from 455/MLCD Project Resource Analyst to 603
- Susan Sparacino from 441/HST Ops. Deputy Project Manager/Resources to 100/ Office of the Director

Code 400 Peer Award Winners for 2005

BOUNDLESS ENERGY AWARD

An award for someone who goes out of the way to do their own job and more, such as volunteering for extra committees, mentoring, outreach activities, or going the extra mile to help others.

Dr. Robin Stebbins, Code 663
"Dr. Stebbins personifies the Boundless Energy Peer Award by his dedication to the LISA Project and Team, his agility in handling numerous tasks and his ability to balance the demands of his unique role."

Dave Scheve, Code 420
"In recognition of your outstanding management of the six development projects, one data processing center, and fifteen operating satellites of the EOS Program with limited budget and the boundless energy in formulating the management approach for the GOES R Program with NOAA, supporting NASA road mapping efforts and the extra effort in guiding new business activities."

Dwight Norwood, SGT
"For your boundless energy, always positive attitude, great personal skills, commitment and dedication to the ST-5 Project."

Angela Hess, SGT
"For continually providing exceptional information technology services and expertise to multiple GSFC organizations, and always having the time, positive attitude and energy to provide help whenever and wherever required."

MISSION IMPOSSIBLE AWARD

An award to recognize someone who has a really big, demanding, seemingly impossible job, yet they manage to successfully keep all the "balls in the air." This award recognizes people who do more with less and/or develop new and creative ways of approaching their work. It can be for either a major initiative or a series of minor ones culminating in a significant impact.

Jennifer Baldwin, Code 402
"In recognition of your demonstrated performance, tact, diplomacy and positive attitude in exercising your considerable expertise in travel rules and regulations. A seemingly impossible job, you accommodate the needs of IPO's nine Operational Algorithm Teams in addition to other IPO travel. You are an excellent emissary to the outside world for the NASA Team."

Arlin Bartels, Code 430

(Peer Awards Continued on page 21)

(Peer Awards Continued from page 20)

"For your unlimited dedication and countless hours worked in leading the successful start-up of LRO Instrument activities. Your efforts are paving the way for successful completion and delivery of the LRO instrument suite."

Andre Dress, Code *416*
"In recognition of your continuous dedication to the GOES N-P Project."

Andy Garland, SGT
"In recognition of your outstanding and dedicated service to the HST Program in the development of the HST Robotic Servicing and De-orbit Mission SRR and PDR."

STEADY HELM AWARD

An award for a good team player, who helps keep the team focused in a crisis. This person keeps things moving, performs well under pressure, and reinforces good morale and respect for all team members during times of stress/adversity.

David Cissell, Code 303
"For your decade long commitment to the Hubble Space Telescope Program. Your dedication, enthusiasm and steady leadership has kept Hubble flying and also inspired your colleagues to pursue excellence in all that they do."

Del Jenstrom, Code 427
"For enthusiastic, dedicated leadership of the Dark Universe Observatory concept study."

Steve Smith, Code 407
"For consistently providing exemplary leadership to the ESTO Information Systems Technology Team since its inception."

ROOKIE OF THE YEAR AWARD

An award for an employee who demonstrated agility by getting up to speed quickly in assuming their new responsibilities as they transitioned to their new duties in a new position.

Donna Montgomery, Code 455
"This award recognizes the huge contributions you made to the Mars "Laser" Communications Demonstration Project during your first year on the Project."

Priti Vasudeva, Code 444
"For your outstanding financial and business support to the Space Science Mission Operations Project and to the Hubble Space Telescope Program Office in your first year as a Government employee."

(Peer Awards Continued on page 22)

(Peer Awards Continued from page 21)

Jennifer Posten, SGT
"In recognition of your outstanding efforts for smoothly running the Graphics and Web Design Office through transition and for your support of the SEU Program Office and Projects."

UNSUNG HERO AWARD

An award for any employee who supports the Directorate from a behind the scenes role. This award recognizes an employee dedicated to their job, who supports the Directorate in a behind the scenes role meeting the needs of customers and co-workers with a can-do attitude.

Julie Janus, Code 210.S
"For voluntarily and successfully providing excellent procurement support to the Lunar Reconnaissance Orbiter Project while still fulfilling the responsibilities of your normal, full workload in support of the STP Program and STEREO Project."

Kathy Shifflet, Code 420
"For long-standing contributions, in dealing with resources not always available, and systems that don't always work, to allow financial and resource needs of the Program Office to be met in a pleasant and efficient manner."

Marsha Gosselin, CSC
"The "Unsung Hero" for a project is defined as a person noted for his/her "dedication, teamwork, and supporting the Directorate from behind the scenes". Marsha Gosselin is truly SDO's Unsung Hero."

Michelle Ondrus, SGT
"For your exceptional service and dedication in support of the IFM Program."

WILD CARD AWARD

This award is to provide an avenue of nomination for persons whose activities don't easily fit into the other award descriptions. It is an opportunity to give special attention to unique activities that further the FPPD's technical and institutional Strategic Objectives.

Brett Weeks, Code 442
"In recognition of your outstanding support and unrelenting dedication to the HST Development Project during a time of chaos and uncertainty."

David Etheredge, Melwood
"David is truly an asset to the Goddard Community and is revered for his exceptional work ethics."

(Peer Awards Continued on page 23)

(Peer Awards Continued from page 22)

MENTORING "UNDER YOUR WING" AWARD

An award for an individual who embraces mentoring and actively participates in the development of others. Recipients of this award coach others for improved performance or to enhance career development and assists mentees with professional and career planning.

Dena Butler, Code 403
"For the outstanding commitment and dedication to the professional development of other individuals, while leading by example and upholding the standards and ideals of the NASA family."

HONORING DIVERSITY AWARD

An award for an individual who contributes to creating an environment where differences are valued and appreciated and who models integrity, respect and fairness in working with others.

Joan Walton, Code 450
"For exceptional leadership in promoting the inclusion of the diversity of all staff members into an effective Program team."

(FeedBack Continued from page 3)

while they are at the Center and each escort must attend this specific class presented quarterly by the 45th Space Wing at CCAFS. STEREO launch is scheduled in April, 2006 from the Delta Pad 17 at Cape Canaveral Air Force Station.

- THEMIS payload team is scheduling their Ground Operation Working Group (GOWG) meeting in November. THEMIS will be processed at the Astrotech facility in Titusville and launched from the Delta PAD 17 on CCAFS in 2006.
- We are happy to have Cynthia Dreyer, join our GSFC Resident Office SGT, Inc. team. Cynthia has been a temporary employee assigned to our office and has become a permanent team member. She will support the GSFC Resident Office by maintaining the large data base of NASA GSFC/Contractors coming to KSC/CCAFS to process payloads. She will request payload processing teams badging and area permits.
- Many changes are taking place at KSC including requests for Badging and Area Permits. Cynthia and Mary have attended classes on the new system that will be initiated in the very near future. This data system utilizes the Personnel Access and Security System (PASS) information and requests will go electronically to the VRC. The PASS Security System will show all of the Safety Training (current/expired), and Security Clearance (Personal Reliability Program (PRP).
- Dr. Woodrow Whitlow Jr., Deputy Director of Kennedy Space Center, will be leaving KSC. He will become the next director of the John H. Glenn Research Center in Cleveland beginning in January 2006. Whitlow will succeed Julian Earls, who is retiring at the end of the year.

Mary Halverstadt

(NOAA-N Continued from page 13)

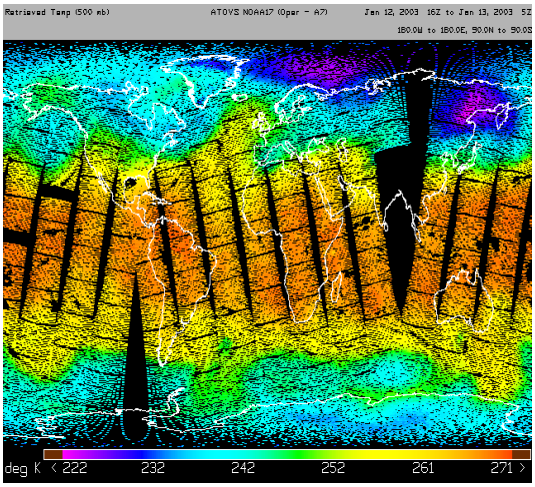
NASA continues the process completing instrument activation and evaluation (A&E) activities. This transition formally occurred on June 9, 2005. The A&E process was completed 45 days after launch on July 3, 2005 when NASA formally turned the satellite over to NOAA for operational use.

The A&E phase of this mission went very smoothly thanks to the advanced planning of the Flight Operations Team (FOT) and the dedication of POES Project team members. The spacecraft is performing well and all instruments were successfully activated with only minor problems currently under investigation. The NOAA Environmental Satellite Processing Center (ESPC), responsible for data processing and generation of meteorological products, has been diligently executing a plan to rapidly complete calibration of the data from NOAA-18 and excellent products are currently flowing to users around the world. Examples of typical polar satellite products are provided for reference. The new SAR instruments are already credited with providing the initial data that has resulted in many more search and rescue "saves".

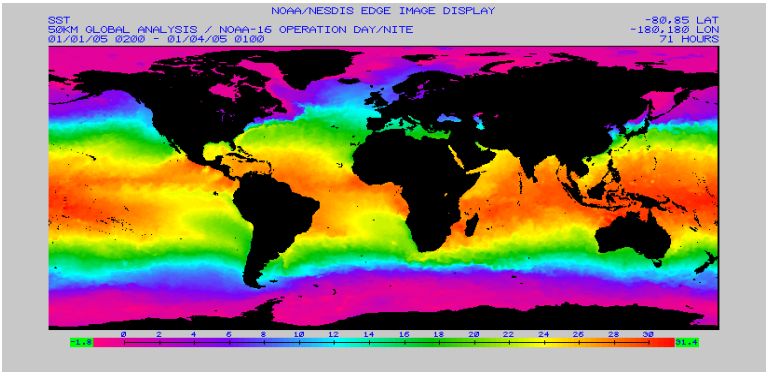
The POES Project is extremely proud of the successful establishment of this new satellite on orbit. The Project has been under intense scrutiny since the NOAA-N Prime accident on September 6, 2003. Project team members have worked together over the past two years to learn from this dark event, implement corrective action, and ensure mission success for NOAA-18. The team is to be congratulated for this achievement.

Dave Coolidge, Code 480

Sample NOAA Polar Products:



Atmospheric Temperature and moisture data



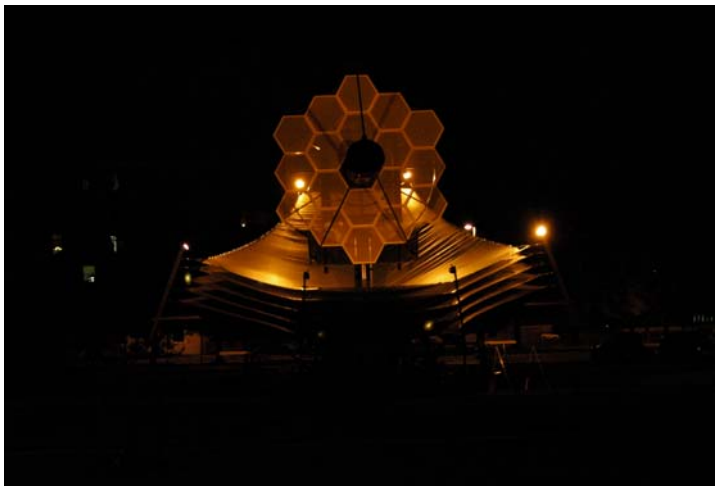
Climate Change analysis associated with EL Nino and La Nina events

JWST on the Mall

Goddard employees were privileged to get a close up view of a full scale model of the James Webb Space Telescope (JWST) during the week of September 19 2005. Named after NASA's second administrator, the JWST will study the birth and evolution of galaxies, stars, and planetary systems from the beginning of time to the present.

Goddard's Flight Programs and Projects Directorate leads an international partnership in this endeavor with Northrop Grumman serving as the prime contractor. Currently planned to lift off in 2013, JWST will be the largest deployable telescope ever launched.

Pictures by Nancy White/Code 403/SGT



(Robotic Continued from page 17)

The question is asked about how much experience is required to make a notable contribution in this emerging field of robotics. Of course robotic devices have been around for decades, but what has really changed lately is the processing power of computers and the relative ease of integrating software. This ongoing explosion in processing power is revolutionizing what is possible and even how difficult it will be to push the state of the art. *Think of a chess computer. If a computer could identify every possible move and its outcome out to the end game, at every point and then decide what move to make, it should be unbeatable. Years ago it would take a computer days to do all those calculations. Today it takes a fraction of a second. What was impractical is now routine.*

One key objective that this team excels at is developing the Artificial Intelligence to make decisions in a variety of difficult and diverse terrain situations. Turns out that many of the prerequisite tasks for vision navigation and obstacle avoidance are driven by this computational capability. The processing power of the desktop computer has exploded so that any job, which can be designed to take advantage of this computer power can suddenly be done by a college student, who is really into computers.

(Robotic Continued on page 27)

(Robotic Continued from page 26)

Another factor enabling this young team to produce significant results is that some very complex hardware such as Ranging LASERs have become relatively inexpensive so that even low budget teams can afford them.

The vision navigation subsystem is computationally intensive. It primarily uses a horizontally scanning LASER Ranging (LADAR) device. This sends out a beam and measures time of flight out to 80 meters with 1-millimeter accuracy. The team designed and built a mechanical scanning platform that moves the LADAR up and down to paint a 3-D image where intensity relates to distance. The goal is to identify obstacles in the field of view. Then the onboard computer analyzes the image and decides whether to drive over or around the obstacles to get to the programmed destination. In addition, Mike says, "One of our software geniuses is almost finished developing a system to convert the imaging scene into a view from the top down and to remember each previous scene. This is truly state-of-the-art. It enables any device to survey an area or inspect an irregular structure and to know what has been done and what remains. Potential applications for this are too numerous to mention."

Today this application of emerging technologies enables immediately useful results. We don't need people with ten years of experience for most of the work involved. We need people who speak the new technology languages and have the passion for the work of applying it. Yes, we need experience to know which way to go, who to impress, where to get the resources, how to present the results, how to avoid the once obvious problems, etc. That's where an experienced top-level manager is also essential. However, what we have been demonstrating in this REAL program is that young, turned-on, technically savvy guys can really produce some top-notch stuff.

"My goal," says Mike, "is to sort out college seniors, who have the initiative and talent to immediately help Goddard develop a viable robotics program in-house. As I see it, we can't wait for the "phone to ring", where some power above bequeaths us a real piece of the exploration action. Instead we need to seize the moment and take the initiative ourselves. We know that any direction we go in exploration certain fundamental capabilities will be required. Autonomous Vision Navigation with intelligence to plan a path, negotiate over it, and then remember where it's been, are universally applicable. Goddard must become the "Go-To" Center of excellence for such capabilities, that can be transferred to any platform in-Space or on planetary surfaces."

As Mark Belz, BSEE remarked, "It's a wonderful experience to start the Summer with lofty goals, and then see all of those ideas come to fruition in a short, 10-week timespan."
The Robotic system was demonstrated to our Center Director, Dr Weiler, and representatives from various AETD Divisions on August 1. It successfully navigated around obstacles all over the MERS terrain without a hitch. Yes, we'll be sending the system back to MSU for another round of improvements, but we hope that this work can be continued at GSFC with some of the current team. This is all still R&D work and funding depends on some of our proposals being accepted by the DDF, IRAD, or Core Competency.

Michael Comberiate, Senior System Engineer Code 400 and Interns

(GOES-N Continued from page 1)

GOES-N is the latest in a series of Earth monitoring satellites. The multimission GOES series N-P will be a vital contributor to weather, solar and space operations, and science. GOES provides a constant vigil for the atmospheric "triggers" for severe weather conditions such as hurricanes, tornadoes, flash floods, and hail storms.

The Goes-R series (see previous issue of The Critical Path), which is currently in the formulation phase, will follow GOES-N-P. Its first launch is planned for 2012

"Cultural Tidbits"

Did you know ... that cross-cultural misunderstandings may arise due to different interpretations of pauses and interruptions during conversation? For instance, speakers of Anglo-Saxon languages might interpret interruptions as impolite, whereas, more verbal Latin speakers might view frequent interruptions as a demonstration of how interested each is in what the other is saying. Speakers of Oriental languages often use silence to show respect to others by taking time to process information. A westerner might interpret this silence as a failure to communicate, whereas the lack of a pause might make a speaker of Oriental languages wonder if the person digested what the other has said.

Do you have a cultural tidbit to share? Send it to the Code 400 Diversity Council c/o Andrea Razzaghi @ andrea.i.razzaghi@nasa.gov and we'll publish it in a future issue.

Part II
"Test Your Project Management Knowledge!"

Sign up today for a future *"Earned Value Management"* or *"Putting Effective Schedule Management into Practice"* class to discuss the answers to these and other project management questions.

Contact Diane Trakas for the current schedule of classes:
dtrakas@pop100.gsfc.nasa.gov or (301) 286-5622

NASA Project Management Challenge 2006

NASA's PM Challenge 2006, the Agency's third annual project management conference, will be held March 21-22, 2006 in Galveston, Texas near the Johnson Space Center. The theme for the 2006 conference is "Putting Ideas into Action." As a mission-driven organization, NASA must continuously strive for improvement in program and project management practices. By sharing ideas, project practitioners increase their knowledge and enhance mission success with more effective, efficient and innovative ways to manage programs and projects.

Check the conference website for registration details: http://pmchallenge.gsfc.nasa.gov

Many Thanks

Bill Schiavone's wife, Debbie, wishes to thank all those at GSFC who expressed their sympathy to the Schiavone family upon Bill's passing. Bill contributed to the success of several Goddard programs during his more than 30 years at the Center, most recently as Deputy Program Manager/Resources in the EOS Program Office. He will be missed by all.

Happy Thanksgiving

Quotes of the Quarter

"“It is not enough to be busy; so are the ants. The question is, what are we busy about? .”
- Henry David Thoreau—

“When they call the roll in the Senate, the senators do not know whether to answer ‘present’ or ‘not guilty’.”
- Theodore Roosevelt -

“I learned that a leader is a man who has the ability to get other people to do what they don’t want to do, and like it.”
- Harry Truman -

“On my arrival in the United States, I was struck by the degree of ability among the governed and the lack of it among the governing ”
- Alexis deTocqueville -

THE CRITICAL PATH SOCIAL NEWS

Congratulations:

Deborah (442) and Jim Cusick are the proud grandparents of not one, but two new grandchildren, bringing their total now to 6. Their daughter, Jennifer and her husband, Michael are the proud parents of Michael Richard Peak, Jr., born on May 15, 2005, at 11:49 p.m. He weighed 6 lbs., 13 oz., and was 18.8 inches long. Big sister Meranda is excited to have a little brother. More recently, their son, Rick and his wife, Breya gave birth to Abrielle on July 24, 2005, at 6:22 p.m. She was 6 lbs., 13 oz., and was 19 ½ inches long. Big brothers Andrew and Christian are all excited about having a little sister.

Congratulations to Jim (400) and Dottie Greaves on the birth of their first grandchild. Wyatt Avery Greaves was born on July 12, 2005. Wyatt weighed in at 7 lbs., 8 oz., and was 19 inches long.

Alyssia King, daughter of Rick King (420) and former GSFC summer student, will be attending Salisbury University this fall. Alyssia, who will be entering as a junior, and as a business major, perhaps one day will be dad’s boss…. In addition, Rick’s son, Justin, will be entering Drexel University as a freshman.

Otilia Rodriguez-Alvarez (461) married Michael Napper on May 22, 2005. Congratulations and best wishes to the bride and groom.

A Visit to Goddard

As Part of Maryland Congressional Day, four key members of Maryland's Congressional Delegation visited Goddard. In front of an overflow, enthusiastic audience, Center Director Ed Weiler introduced: Senator Paul Sarbanes; Senator Barbara Mikulski; Congressman Ben Cardin, and Congressman Roscoe Bartlett. Joining them on the stage was former Center Director Al Diaz.

Each person spoke warmly about their individual love and support of NASA and how the Maryland Congressional Delegation has collaborated over the years in a true bipartisan way (better than any other delegation). They individually lauded the efforts of Goddard employees on behalf of NASA's space program and Goddard's contributions in particular. They also talked about how closely they have worked with both Dr. Weiler and Mr. Diaz in their various capacities in the past to enhance NASA's ability to do its most meaningful work. Dr. Weiler also praised the delegation's support for Goddard and NASA for decades.

(Loiacono Continued from page 3)

from that project, and the TOMS team presented them to other groups, including NASA's JSC for their interactions with the Russians on the Space Station. When asked why Meteor-3 TOMS was so successful, the first things that come to his mind are a dedicated team that formed outstanding relationships and partnerships between NASA, Perkin Elmer (now OSC), and the Russians.

After Meteor-3/TOMS, John was selected into the George Washington University's Masters in Engineering Management Program, but when asked by GSFC Center Director to assist the Earth Probes/TOMS Project Office as the in-plant representative in California, John jumped at the opportunity; again postponing his formal training. He led the ADEOS/TOMS integration team in Japan.

Next, he was selected as Deputy Experiment Manager for HST/Space Telescope Imaging Spectrograph (STIS) instrument in Code 680. STIS was fairly complex, with new detector technologies and more operating modes and mechanisms than some spacecraft. It was installed into HST on the second servicing mission. After HST, John was transferred to Code 730 as Senior Systems Engineer, working on EO-1/Advanced Land Imager and Hyperion instruments.

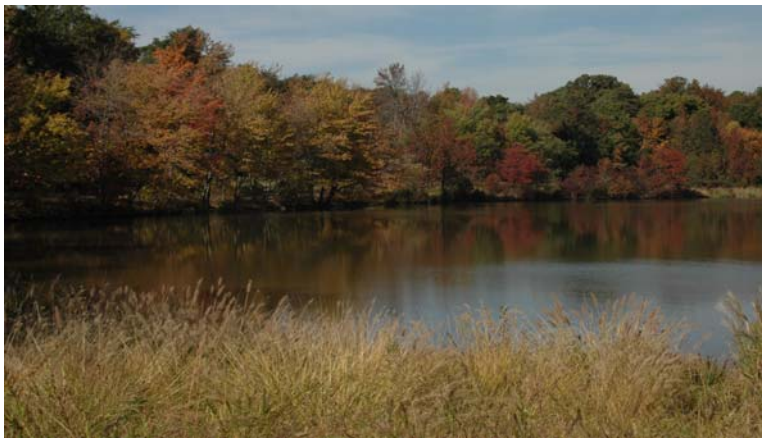
John was selected as EOS-Aura Instrument Systems Manager, and, later, was appointed as Aura's Deputy Project Manager. He was the Aura Spacecraft Mission Director for Aura's launch. With so many issues popping up at the 11th hour, along with John calling the "hold" on one of the two scrubbed launch attempts, John asked GSFC Deputy Center Director, Bill Townsend, whether this was normal for a launch. After the launch, Bill Townsend wrote a couple of articles about the challenges the Aura team faced and how they were resolved.

On his new job: John was drawn to leading a proposal team because he wanted to help GSFC win new business. He was attracted to EPIC particularly because of its novel technical approach and its awe inspiring science. He says: "My title, 'Capture Manager,' is somewhat unusual, but it definitely describes what's required."

On Family: John and his wife Kelly are busy raising their two boys in Annapolis, Maryland. He lives in Bay Ridge on Lake Ogleton, and is normally found woodworking, or working on the house, or boating, fishing and swimming with his family.

On Community: John is very active in his community, helping raise and construct a $0.5 Million community pool and helping raise $5 Million to purchase over 100 acres in his community to stop it from being developed. Every year he leads his block in constructing a float for the community's 4th of July Parade for the kids in his neighborhood.

NASA: Explore. Discover. Understand.
www.nasa.gov



Goddard in the Fall

FUTURE LAUNCHES CALENDAR YEAR 2005	
GOES N	NOV
CALIPSO	NOV
CLOUDSAT	NOV
TWINS-A	TBD

Note

This represents a combined expanded Summer-Fall issue of The Critical Path. Starting in 2006 it will be published three times a year.

ATTENTION INTERNET BROWSERS:

We're on the WEB
http://fpd.gsfc.nasa.gov/news.html
Or via the New "Code 400" Homepage
http://fpd.gsfc.nasa.gov

The Critical Path

Published by the Flight Programs and Projects Directorate

— In March, July, and November —

Howard K. Ottenstein,
Editor

Nancy L. White,
Production Assistant/Photographer

Paula L. Wood,
Editorial Assistant

If you have a story idea, news item, or letter for The Critical Path, please let us know about it. Send your note to Howard Ottenstein via Email: hottenst@pop400.gsfc.nasa.gov, Mail: Code 403, or Phone: 6-8583. Don't forget to include your name and telephone number. Deadline for the next issue is Feb. 3, 2006.