

# AEROSPACE NOW

Vol. 2, No. 7

July 2010

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Sensors Provide  
**ENLIGHTENING** Images of Earth **6**

**Global Hawk Performs  
Atmospheric Research** **8**

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**Pulsing the Planet**

***NORTHROP GRUMMAN***

**NORTHROP GRUMMAN**



*Our satellites above are safeguarding life below.*

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▼ **ENVIRONMENTAL**

Northrop Grumman is committed to taking on the environmental challenges ahead. Our family of satellites has been collecting environmental data continuously and reliably for decades. Policymakers are using that information to make decisions that will benefit and protect life on earth. Put simply, we are helping keep a watchful eye over the planet itself.

# AEROSPACE NOW

**Northrop Grumman  
Aerospace Systems**

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**NORTHROP GRUMMAN**

## July 2010

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This month, NASA's Northrop Grumman-built Aura satellite celebrates the completion of its six-year design life goal. Launched in 2004, Aura will have completed 31,915 orbits on its anniversary while carrying out its mission to study the composition, chemistry and dynamics of the Earth's atmosphere.

# SPACE

# air's

# Global



## Taking the High Ground

Taking the high ground gives military forces a strategic advantage. It affords the best perspective to make decisions and influence positive outcomes.

Earth observation is no different. Using the vantage point from the air and from space-based platforms gives a clearer picture of what is occurring with our planet's complex climate dynamics. That's important. Catastrophic weather and climate changes can adversely impact our planet, affecting food and water supplies, biodiversity, energy management, aviation systems and public health. This same mission is also one of national security. Our military depends upon accurate weather forecasting to carry out operations. Our intelligence community regards climate change as a potential destabilizing factor in fragile nations.

Aerospace Systems is a leader in developing systems to monitor, interpret and deliver accurate weather and climate information. We were the prime contractor on two of NASA's Earth Observing System satellites. Aqua focuses on the study of water in the Earth/atmosphere systems, while Aura measures pertinent data relating to atmospheric chemistry and climate change. We have industry-leading expertise designing and building key sensors and instruments such as hyperspectral imagers and Clouds and the Earth's Radiant Energy System radiometers. And this year, our NASA customer is carrying out Earth science missions using Global Hawks that host sensors calibrated with the Aura satellite.

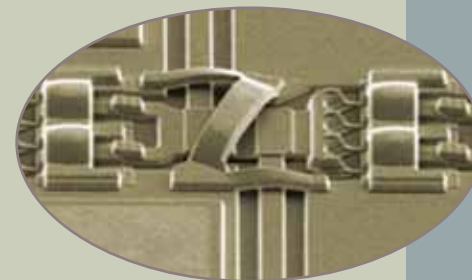
The recent volcanic eruption in Iceland, earthquake in Haiti and oil spill in the Gulf of Mexico have pointed to the urgent near-term needs for Earth observation capability. And while scientific environmental missions like Aura and Aqua are valuable, the international community recognizes that only a truly operational global climate-monitoring system will provide accurate, actionable information. So whatever the ultimate direction of the National Polar-orbiting Operational Environmental Satellite System, our experience positions us to provide solutions to meet future needs.

There's a great opportunity for us to grow. The ability to deliver both the space and air components of Earth observation missions will give us a competitive advantage. Another key to our success will be leveraging synergy across our sector. The skill sets and knowledge base to carry out this work exist in all our divisions. While the missions may be different, the capability is applicable to a range of customers. Global Hawk, for example, is a platform developed for the military that is now being used by a civil customer. And hyperspectral imagery has applications for both Earth observation and national security missions.

Earth observation is, by definition, about looking at the big picture. As a company, we must do the same. That translates into tapping into our great potential to deliver capabilities more efficiently and cost-effectively, no matter the mission. No matter the customer.

# news briefs news briefs news briefs

## Northrop Grumman Doubles Frequency of Fastest Reported Integrated Circuit



Aerospace Systems has set a new electronics performance record with a Terahertz Monolithic Integrated Circuit (TMIC) operating at 0.67 terahertz (THz), or 0.67 trillion cycles per second. Developed at the company's Simon Ramo Microelectronics Center under a contract with the Defense Advanced Research Projects Agency's (DARPA) Terahertz Electronics program, this new performance record more than doubles the frequency of the fastest reported integrated circuit. Dr. William Deal, THz Electronics program manager for Aerospace Systems, told fellow scientists that the TMIC amplifier is the first of its kind operating at 670 gigahertz. The goal of DARPA's Terahertz Electronics program is to develop the critical device and integration technologies necessary to realize compact, high-performance electronic circuits that operate at center frequencies exceeding 1.0 THz.

## Commitment to Cybersecurity Education Begins with High School Students

Northrop Grumman will be the "Presenting Sponsor" of the Air Force Association's (AFA) CyberPatriot III, the national high school cyber defense competition designed to excite, educate and motivate the next generation of cyber defenders. The sponsorship was announced at the National Press Club in Washington, D.C. As the presenting sponsor, Northrop Grumman will invest time and resources during the 2010-11 school year to assist in coaching teams and mentoring students. The company's involvement in CyberPatriot will contribute to building a talent base in the cybersecurity field that will ultimately ensure the country's future cyber protection. The AFA has held two previous CyberPatriot competitions with Air Force Junior Reserve Officers' Training Corps (JROTC) students from 41 states and Japan. CyberPatriot

III will be the first competition open to all-service JROTC students, as well as students from non-military-affiliated high schools.

## Electronics Systems Sector Selected to Supply National Maintenance Services and Logistic Support to the Federal Aviation Administration

A provider of air traffic control services to the Federal Aviation Administration (FAA) and Department of Defense for more than 40 years, the Electronic Systems sector received its latest contract from the FAA to provide national maintenance services and logistic support of several critical FAA communications products and systems. Under the terms of the contract, Electronic Systems will ensure the existing communications systems, hardware, firmware and documentation are supported into the year 2015. The company will supply around-the-clock technical assistance support, including next-day delivery of critical repairs. To date, Northrop Grumman has delivered more than 1,400 voice communications systems and 600 digital voice recorder systems to customers worldwide.

## Aerospace Systems Opens Office to Support Global Hawk Basing



Northrop Grumman Corp. opened an office in Grand Forks, N.D., in a ceremony May 21 to provide support for the RQ-4 Global Hawk unmanned aircraft systems being assigned to Grand Forks Air Force Base. The office could eventually employ more than 100 people and attract suppliers and subcontractors as the number of aircraft increase at the base. At the opening ceremony, George Guerra, Northrop Grumman vice president for High-Altitude Long-Endurance Systems, presented a \$25,000 grant in the form of a large facsimile check to the University of North Dakota for

the John D. Odegard School of Aerospace Sciences, recognizing its advances in the area of unmanned systems research. The University of North Dakota is the first school to offer a Bachelor of Science degree in Unmanned Aircraft Systems Operations.

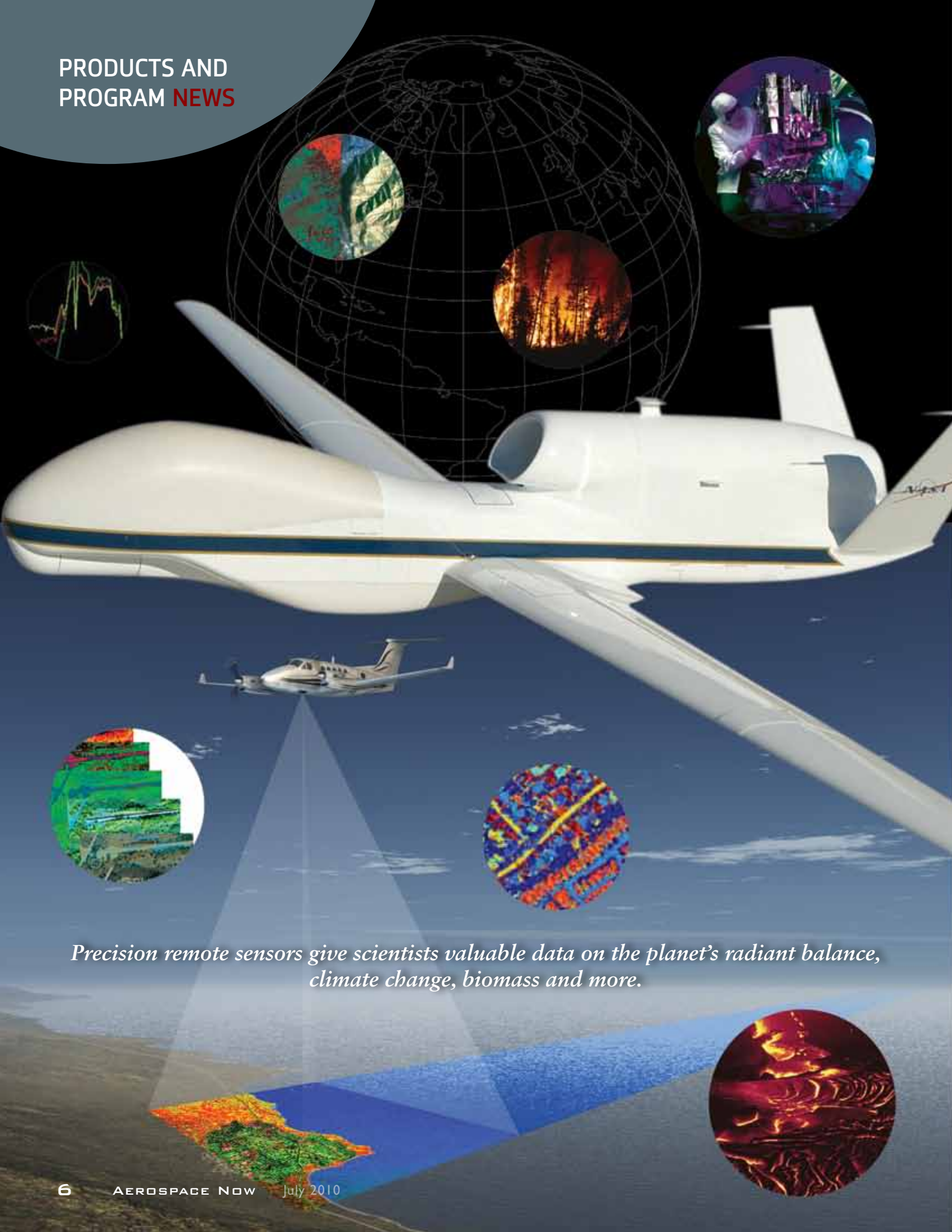
## First Airborne Ka-Band Satellite Terminal Completes Flight Testing

Northrop Grumman Information Systems' completion of flight testing of an airborne satellite communications system represents the first airborne terminal system to be certified for connection to the Wideband Global Satellite (WGS). The system is part of a network that will significantly enhance communications capabilities for warfighters. Wideband Global Satellites are elements of a system that increases U.S. communications capabilities, supporting the U.S. Department of Defense's warfighting information exchange requirements, enabling execution of tactical command, control, communications, computers, intelligence, surveillance and reconnaissance, battle management and combat support information. The Ka-band WGS link uses a less-congested frequency band than other satellites and enables high data-rate information assimilation by airborne and ground-based terminals.

## Corporation Awarded Global Hawk Sensor Suite Repair Capability Contract

The U.S. Air Force has awarded Northrop Grumman Corp. a \$50 million firm fixed-price/cost plus fixed-fee contract to provide the Global Hawk unmanned aircraft program with an interim repair capability for its integrated sensor suite (ISS) and the enhanced integrated sensor suite (EISS). The interim repair line, which will be separate from the current production

line, will be located and operated at Raytheon Space and Airborne Systems (SAS) in El Segundo, Calif. Raytheon SAS is partnered with Northrop Grumman to provide the EISS imaging system for the Global Hawk Block 20 and 30 systems. The sensor interim repair line will be the first dedicated repair facility established by the U.S. Air Force for Global Hawk and will significantly improve the availability of the critical ISS and EISS components in support of increased operations tempo.



*Precision remote sensors give scientists valuable data on the planet's radiant balance, climate change, biomass and more.*

### MARY BLAKE

Scientists the world over have a rapidly increasing need for accurate and timely imagery and measurements for all types of environmental monitoring, including rainforest biomass, volcanic lava flow, invasive species trends, wildfire fuel conditions, the Earth's radiant energy system and much more.

With the right sensors to see what can't be seen by the human eye, enlightening pictures of the Earth emerge. Hyperspectral sensors, 3D Laser Detection and Ranging (LADAR) systems and space-based broadband radiometers in low Earth orbit give resource managers like farmers, urban planners, foresters and environmental analysts powerful tools to help classify features, identify trends and recommend mitigation strategies. Airborne hyperspectral imagers can give scientists extremely detailed materials and species information about forests, deserts, oceans, agricultural fields and urban areas. Instruments of this type, which are accurately calibrated with high spectral resolution and noise performance and can be rapidly deployed in the field, are critical to future missions.

Aerospace Systems' Hyperspectral Airborne Terrestrial Instrument (HATI) is one example of this new generation of instruments. HATI is a successor

to Hyperion, our space-based imager that has delivered an unprecedented amount of observations of the Earth in its 10 years on orbit. Proven on field campaigns, including NASA Ames' Innovative Partnership Program, HATI is a commercial off-the-shelf-based, quick-to-field instrument that provides more than three times the spectral resolution of Hyperion across the ultraviolet to shortwave



## Making Earth's Temperature

infrared (solar reflective) wavelength.

Our sector is also developing an airborne flash LADAR imager that can efficiently deliver high-resolution 3D images of land characteristics. This is useful for measuring total biomass in areas with a high canopy of trees over vegetation.

A LADAR system, which sends out photons that penetrate the foliage from several different angles and reflects them back, compiles the data and delivers a 3D data product that describes the shape, size and volume of any structure. This allows researchers to measure carbon sequestration rates: the rate at which carbon is removed from the atmosphere through physical or biological processes such as photosynthesis.

"When you are able to combine these two types of data — hyperspectral and 3D imaging — you have a very powerful data product for characterizing both man-made and natural structures," explained Mark Folkman, director, Products and Sensing, Aerospace Systems. "To achieve the benefits of these new sensing modalities requires precise characterization and calibration of these instruments. We've made significant investments in facilities and processes to achieve the accuracies required."

Investment and research are also ongoing in laser technology to support 3D LADAR systems for both space and airborne platforms. Our current laser technology saves space, reduces thermal management issues and provides substantially higher laser efficiency compared to previous lasers.

A promising use of airborne hyperspectral imaging and flash LADAR imagers is on unmanned aerial systems (UAS) such as the Global Hawk, a high-flying jet designed and built by Aerospace Systems, initially for military reconnaissance.


The company is investing in preliminary engineering work to integrate these sensing instruments onto the platform.

Global Hawk is the first UAS capable of

lifting a heavy payload of instruments and traveling distances covered by manned planes. These capabilities enable researchers to collect samples for a longer period of time over a wider range and open up the possibility of UAS exploring parts of the Earth such as the Arctic.

In addition to Hyperion, current space-based sensors produced by our sector include the Clouds and the Earth's Radiant Energy System (CERES), the most precisely calibrated radiometers ever flown in space. Clouds, which reflect, absorb and trap radiant energy, are essential in maintaining the Earth's radiant energy balance, a balance threatened by the buildup of carbon dioxide and other greenhouse gases. CERES measures the energy emitted and reflected from the surface of the Earth and the atmosphere. Aerospace Systems is the prime contractor for CERES. The next CERES is on NASA's National Polar-orbiting Operational Environmental Satellite System Preparatory Project satellite.

Instruments, including hyperspectral sensors, that sense in the infrared spectral range must operate at very low temperatures to achieve the required sensitivity. Some astronomy missions require temperatures in the sub-1-kelvin range, calling for reliable and efficient cryocoolers. In the past, cooling in orbit was only possible using large, heavy cryostat cooling systems that had limited life and were difficult to reliably deploy in space systems. Northrop Grumman is solving this problem by producing compact, highly reliable cryocoolers for space. "We've delivered more than 28 space-qualified cryocooler systems, and none of them have failed or even changed performance on orbit," explains Jeff Raab, Aerospace Systems Cryocooler Systems manager.

By enabling such a large variety of science data measurements, Earth-imaging sensors enable scientists to monitor a rapidly changing global climate. This valuable data is used to support critical decision-making and mitigation efforts in response to these changes. 

# HAWKISH ABOUT ENVIRONMENTAL SCIENCE

## DIANE HENSLEY

It has viewed hot spots in the worst California wildfires. It has returned images of earthquake-ravaged Haiti. It has surveyed weather effects during Hurricane Ike. And now, for the first time, it's embarking on environmental science missions to bring back data about the atmosphere on flight paths that will take it to remote parts of the world.

This Northrop Grumman bird is truly a Global Hawk.

A Space Act Agreement between NASA Dryden Flight Research Center and Northrop Grumman established a partnership to refit and maintain two Global Hawk aircraft transferred to NASA from the U.S. Air Force. As part of the Northrop Grumman/NASA partnership, the company contributed to the Global Hawk Pacific (GloPac) missions by developing GloPac mission plans; confirming aircraft performance through extensive analysis; providing pilots and training for NASA/NOAA (National Oceanic and Atmospheric Administration) pilots; sharing maintenance and operations support; and developing and building a new ground

control station and software for aircraft operations. Additionally, under a contract from NASA, Northrop Grumman performed aircraft modification engineering and analysis for installation of the science payloads. For GloPac, NASA and NOAA provided 11 sensors: an array of scientific, environmental research instruments. Scientists and technicians from seven science institutions worked together to profile the dynamic meteorology in Earth's lower atmospheric layers — the stratosphere and the troposphere — and observe the distribution of clouds and aerosol particles.

The GloPac missions flown in April involved a series of long-duration flights over the Pacific Ocean, near Hawaii and the equator, and about 300 miles from the North Pole.

"With its capacity for long-distance, high-altitude flights that can last over a day, Global Hawk presents a new chapter in Earth science for NASA," said Chris Naftel, NASA's project manager for Global Hawk at Dryden. NASA believes the Global Hawk's 30-hour flight time capability, coupled with the high altitudes it can achieve, will provide an unprecedented amount of data of different types for atmospheric analysis and open the

door to expanding its potential for real-time data collection from the heart of hurricanes and other storms too dangerous for manned aircraft, he said.

"It's a very exciting time. This is the first time that Global Hawk has been used for science," Naftel added.

Equipment payloads, containing all the instrumentation scientists and technicians need, reached the 1,200-pound mark, according to David Fahey of NOAA. The high-definition cameras, ozone sensors and other instrumentation checked the accuracy of NASA's Aura satellite, which measures ozone, air quality and climate data. Global Hawk flew underneath the orbiting satellite and collected data simultaneously to see if its data matched that of the satellite.

Together the flights validated and collaborated with data generated from NASA's Earth-monitoring satellite missions. They make it possible to observe stratospheric trace gases from mid-latitudes to the tropics and permit precise measurements of dust, smoke and pollution that cross the Pacific from Asia and Siberia.

"It's been a long time waiting for this

important moment," said Dr. Paul Newman of NASA Goddard Space Flight Center in Greenbelt, Md. "I immediately wanted to use the Global Hawk when I learned about it in 1999. I thank Northrop Grumman, L3 Communications for their satellite dish images, and Chris Naftel and his team for making it possible. We dreamed of this, and now it is a reality. These engineers, pilots and flight crews are the best in the world."

Newman said the GloPac missions prove the Global Hawk is an ideal science platform and achieve several NASA goals to get vertical profiling over the equator and validate satellite information. Its initial science mission took place April 7, and three additional science flights kept the Global Hawk aloft for several more 24-hour periods. The missions totaled 82 hours, and the longest single mission was 28.6 hours.

Fahey said NOAA's partnership with NASA and Northrop Grumman is "extremely meaningful."

"Our pairing continues a tradition that extends the paradigm of high flyers into

the science arena. We hope to continue with other proposals, so this is just the beginning. There's no manual here — just our dreams and the high-quality people who make the missions possible," Fahey said.

For atmospheric physicists in the Forecasting Room at NASA, the Global Hawk is providing novel data from their instruments used to verify existing climate models.

"I want to know how well we verify measurements that are taken. We want this kind of validation as the plane flies more of an east-west track. Because the polar satellites travel north and south tracks, the east and west transit is quite novel for us," said Peter Colarco, an atmospheric physicist at NASA. "We don't have access to data like this."



Images courtesy of NASA



Bottom left and right images: View from a Global Hawk Pacific (GloPac) aircraft as it approaches the Pacific Ocean's coastline. Under a contract from NASA, Northrop Grumman performed aircraft modification engineering and analysis for installation of the science payloads on GloPac.

## More Room for a View with GloPac Missions



# Success Speaks for 'Silent Sentries'

## Defense Support Program Satellites Observe 40 Years of Reliable On-orbit Performance

DSP  
40  
YEARS

EYES IN  
THE SKY

### BOB BISHOP

When the world marked Sputnik's 50<sup>th</sup> anniversary three years ago, it was only a matter of time before many other on-orbit milestones would follow, hailing back to the earliest years of the space race.

Each succeeding anniversary has been proclaimed for its breakthrough success to commemorate humankind's initial ventures into the harshest operating environment of all, and rightfully so.

But anniversaries are not always about the past alone. Some stand out not only for their place in history but also for their continuing contributions. Such is the case with Northrop Grumman-built Defense Support Program (DSP) missile warning satellites.

"This program has contributed to the nation's security for 40 years," said Gabe Watson, vice president, Missile Defense

and Missile Warning Programs for the Space Systems Division. "It has produced many technical innovations, provided the nation with a reliable missile warning system and has honed the expertise of several generations of engineers and technicians who have contributed to other Northrop Grumman programs."

DSP is a constellation of satellites in geosynchronous orbit that use infrared sensors to detect the heat from missile and booster plumes against the Earth's background. These orbiting sentries have been the linchpin of the U.S. Missile Warning System since the first of 23 spacecraft was launched in 1970. For the past 40 years they have detected and provided early warning of missile launches, space launches and nuclear explosions.

"DSP is one of the most successful military space programs in the country's history," Watson noted. "The best example of how well they have performed is their collective longevity. They have exceeded their design life requirements by more than four times. They have provided an extra 184 satellite years beyond their required life on-orbit."

Each satellite consists of a spacecraft built by Aerospace Systems and a primary infrared payload built by Northrop Grumman's Electronic Systems sector. Aerospace Systems integrated the sensors and spacecraft for its customer, the U.S. Air Force.

### Full-scale Model

To commemorate 40 years of exceptional reliability and on-orbit performance, the Space Systems Division configured a

full-size model of a DSP satellite for display at the National Museum of the U.S. Air Force at Wright-Patterson Air Force Base, Ohio.

The 35-foot-long model is the only full-size representation of the satellite shown to the public. It consists of the Structural Test Model mated to the Infrared Sensor Trailblazer component without the associated electronics.

The model is scheduled for shipment to the museum aboard a C5 aircraft in the same shipping container used for actual DSP satellites.

"We are honored the Air Force has accepted our model to celebrate the 40-year history of DSP's robust performance as one of the nation's vital missile early warning systems," said David DiCarlo, sector vice president and general manager, Space Systems Division,

Redondo Beach, Calif., where the spacecraft and sensors were integrated.


Likewise, the Electronic Systems sector highlighted its key role on the program. "We are proud to have produced the payload for the primary DSP mission at our facility in Azusa, Calif.," said John Johnson, sector vice president and general manager, ISR Systems Division. A display in the museum at Wright-Patterson is a fitting tribute to the program's success, he added.

Sustainment and support work for the existing constellation will continue from both sites. Production of DSP satellites ended in 2005, when Aerospace Systems shipped the 23<sup>rd</sup> DSP satellite to Cape Canaveral Air Station. The model's configuration was performed as part of the company's close-out of DSP production

contracts from the Air Force.

### DSP Highlights

- DSP served a critical role during Operation Desert Storm, detecting the launch of Scud missiles and providing timely warning to civilian populations, coalition forces and commanders. Gulf War experiences confirm DSP's flexibility in dealing with tactical as well as strategic threats.

- In recent years, scientists have developed methods to use DSP's infrared sensor as part of an early warning system for natural disasters such as volcanic eruptions and forest fires. In addition, researchers at The Aerospace Corporation have used DSP to develop portions of a hazard support system that will aid public safety in the future. 



Artist Phillip Weisgerber's concept of a DSP satellite on-orbit.



Solar array panels are integrated into DSP spacecraft at Space Park in Redondo Beach, Calif.

# STRUCTURALLY

Photo by Edgar Mills



## Team Hosts Annual Air Force A-10 Structural Integrity Summit

The Aerospace Systems A-10 integrated product team recently hosted the annual U.S. Air Force A-10 Structural Integrity Summit in Bethpage, N.Y.

# SOUND

## MARGUERITE KASSINGER AND DEBBIE BOHACS

Under the legacy Aircraft Structural Integrity Program (ASIP), the Northrop Grumman Aerospace Systems A-10 integrated product team (IPT) recently hosted the annual U.S. Air Force A-10 Structural Integrity Summit in Bethpage, N.Y.

Representatives from the U.S. Air Force Air Combat Command, Air Force Reserve Command, A-10 Systems Program Office, Air National Guard and the Air Force Engineering and Technical Support group met in Bethpage with the Aerospace Systems IPT and representatives from Lockheed Martin, Southwest Research Institute and Boeing. These representatives discussed structural integrity planning and progress and examined the A-10 Fuselage/Empennage fatigue test article, which is undergoing teardown inspection in Plant 26. The fatigue test completed 29,457 equivalent flight hours in November 2009.

The A-10 Legacy Aircraft Structural Integrity Program task order was awarded last September to Lockheed Martin and team member Aerospace Systems. It was one of several task orders competed and awarded under the A-10 Thunderbolt Life-cycle Program

Support (TLPS) contract. The TLPS contract is a 10-year Indefinite Delivery/Indefinite Quantity contract awarded to Lockheed Martin, Northrop Grumman Technical Services and Boeing, enabling the Air Force to competitively procure A-10 engineering and technical services from these contractors.


The A-10 IPT in Bethpage is recognized as the original equipment manufacturer (OEM) and is well known for its expertise in executing Air Force ASIP requirements, as well as its overall A-10 weapons systems knowledge and experience. This team has maintained continuous involvement in the modernization of the jet, integrating the inertial navigation system in the 1970s, developing and installing the low-altitude safety and targeting enhancement ground collision avoidance system in the 1980s and the night vision imaging system in the 1990s. The team has demonstrated particular leadership in the planning and analysis required for managing structural integrity of the airframe through various changes in flight maneuver spectra, mission and force structure.

Today, the active A-10 fleet comprises approximately 350 aircraft. Its key attributes of dramatic low-altitude maneuverability, lethality, "get home safe" survivability and

mission-capable maintainability have enabled the A-10 to maintain its role as the premier close air support aircraft for the Air Force. The A-10, affectionately nicknamed "the Warthog," has performed with distinction in both the Desert Storm conflict of the 1990s and in the more recent Enduring Freedom, Iraqi Freedom and Global War on Terror engagements. It is intended to be in service at least until 2028.

The A-10 Aircraft Structural Integrity Program began with the initial A-10 development contract, with definition of materials and processes, design analyses, component and full-scale testing, and data collection and analysis on an aircraft-by-aircraft basis, used to validate analyses and accurately predict fatigue damage for the optimization of inspection intervals and maximization of aircraft availability.

The Aerospace Systems IPT continues to be a key member of the Air Force-led A-10 ASIP team, providing loads and structures analysis, performing full-scale and component testing, developing structural reinforcements and non-destructive inspection methods.

The A-10 TLPS Legacy ASIP task order has a contract value of approximately \$7 million and a period of performance of 24 months. A number of former OEM team members are now part of the Aerospace Systems A-10 IPT, located in St. Augustine, Fla., and in Bethpage, where work is currently under way. 

# Fitting [Finale]

## Dedication to the F-14 Tomcat in Bethpage

### SUSAN WETZEL

Last spring, a display case exhibiting memorabilia from the last F-14 Tomcat ever flown for the U.S. Navy was installed in the rear lobby of Northrop Grumman's Building 25 in Bethpage, N.Y. This installation marks the conclusion of the emotional F-14 dedication that took place in August 2008, when the Tomcat itself was installed outside the Battle Management and Engagement Systems Division building.

The display case contains various memorabilia, including a photo montage of the heartfelt memorial to the aircraft that was written by Lt. Tommy "da Wrench" Ober, Strike Fighter Squadron VF-31 — the last F-14 squadron maintenance officer — and a U.S. flag, both currently sealed in the cockpit as a "time capsule." Also included in the display is the Tomcat's logbook opened to the last flight to Farmingdale, N.Y., two photographs of the F-14 in its last flight just prior to final landing at Republic Airfield on Long Island, N.Y., its legacy Grumman ID tag and a copy of the 2008 dedication ceremony ticket.

A copy of the book "Tomcat Bye-Bye, Baby...! Images and Reminiscences from 35 Years of Active Service," compiled by Dave Parsons, George Hall and Bob Lawson, is also in the display. This commemorative book summarizes the history of the F-14 Tomcat as seen through the eyes of the men and women who flew and maintained her. It is autographed by Vice Adm. David "DJ" Venlet, commander, Naval Air Systems Command, and keynote speaker at

the 2008 F-14 dedication ceremony; Bob Smyth, former Grumman chief test pilot and pilot of the F-14's first flight on Dec. 21, 1970; Lt. Cmdr. Robert "Fitz" Gentry, VF-31, radar intercept officer on the F-14's last flight on Oct. 4, 2006; Lt. Ober; and Cmdr. James "Puck" Howe, VF-31, last F-14 squadron commanding officer.

Aerospace Systems' Media Services graphics lead Ted Kole oversaw the design of the showcase along with Hicksville, N.Y.-based Creative Models and Prototypes ([www.creativemodelshop.com](http://www.creativemodelshop.com)). The aircraft and its ID tag are on loan to the Grumman Retiree Club from the National Museum of Naval Aviation, Naval Air Station Pensacola, Fla. The time capsule certificate, flag and logbook were donated by VF-31, and the autographed book was donated by Northrop Grumman.

Aerospace Systems' Joe Wilkers, director of Architectures and Concept Development, Information Operations and Electronic Attack, spearheaded the project that brought the aircraft to Bethpage. "Partnered with our friends in the Grumman Retiree Club, we hope that displaying these historical artifacts and this marvelous aircraft, which, even after 36 years, still looks menacing and at technology's edge, will continue to inspire the generations of engineers who will see it every day as they drive to and from work," he said. "The F-14 Tomcat now belongs to the annals of naval aviation as the greatest fighter ever flown. Well done, baby!" 

# GRUMMAN



Photo by Edgar Mills

Pictured is the F-14 dedication display case installed in the rear lobby of Aerospace Systems' Building 25 in Bethpage, N.Y.



# Konnichiwa, Global Hawk!

## High-flying Aircraft Debuts in Tokyo

### GEMMA LOOCHKARTT

The RQ-4 Global Hawk unmanned aircraft system (UAS), developed and built by Northrop Grumman, made its debut in Tokyo in front of nearly 300 Japanese military and defense industry officials and reporters. With a wingspan of nearly 131 feet, a full-scale model of the Block 30 Global Hawk was on display earlier this year at the Plaza Industry Ota Exhibition Center, located near the Tokyo Haneda International Airport. Japan was the final stop for the model, which has been touring the Pacific region, including Hawaii, Guam, Australia and Singapore, for the past two years.

"We hope this model display will enhance Japan's understanding of the system's design for long endurance, safety and reliability, as well as encourage Japan's Ministry of Defense to consider it for inclusion in the mid-term defense plan set to begin in Japan during fiscal year 2011," said Curt Orchard, vice president for Northrop Grumman International Inc. in Japan. "Capable of flying well above all civil air traffic at altitudes up to 60,000 feet for more than 32 hours at a time, Global Hawk is a suitable intelligence, surveillance and reconnaissance (ISR) asset for Japan."


Global Hawk has been flying more than 11 years, including operations in national airspace in the United States and other countries. It is still the only UAS to receive both a U.S. Air Force airworthiness certificate and a Federal Aviation Administration certificate of authority, allowing routine operation in civil airspace.

"Enhancing Japan's ISR is essential for its security, so it is vital for Japan's study of UAS to move from paper to hardware," Orchard said. "Global Hawk can make significant contributions to Japan's ISR capability and can serve as a crucial 'first responder' during

natural disasters with its ability to collect and share information in near-real time with allies and partners, enhancing both national and regional capabilities."

Configured to carry an airborne signals intelligence payload, the Block 30 will be extremely important for situational awareness and intelligence gathering across huge areas of land. The Global Hawk's range of 10,000 nautical miles means that a single mission can support missions across much

of the U.S. Pacific Command area spanning Northeast and Southeast Asia.

The Global Hawk does not carry weapons but instead carries multiple intelligence or multi-INT, sensors capable of imaging with high-resolution radar, electro-optical and infrared, as well as signals intelligence sensors. It recently flew disaster-relief missions in support of the Haiti earthquake, providing thousands of images to various recovery and relief agencies. 



With a Block 30 Global Hawk full-scale model serving as a backdrop, Curt Orchard, vice president for Northrop Grumman International Inc. in Japan, speaks to a crowd of Japanese reporters regarding the high-flying unmanned aircraft system's recent missions and successes.



A Japanese industry official gets an up-close and personal look at the full-scale Global Hawk model on display at the Plaza Industry Ota Exhibition Center near the Tokyo Haneda International Airport in Japan.



## Spacecraft Completes Six-year Design Life, Continues to Send Data on Atmospheric Phenomena

SALLY KORIS

On July 15, NASA's Northrop Grumman-built Aura satellite celebrates the completion of its six-year design life goal. Launched in the early morning from Vandenberg Air Force Base in California in 2004, Aura will have completed 31,915 orbits on its anniversary while carrying out its mission to study the composition, chemistry and dynamics of the Earth's atmosphere, gathering data on ozone, air quality and climate.

The first satellite with the capability to gauge the concentration and movement of gases in the troposphere, a region seven to 10 miles above the Earth's surface that most affects human life, Aura has:

*"Aura has proven to be the most comprehensive chemical laboratory orbiting 700 kilometers above the Earth..."*

Karen Okawa

- Measured a significant drop in nitrogen dioxide emissions over Beijing during the 2008 Olympics;
- Tracked sulfur dioxide and ash plumes from every volcanic eruption since launch to aid in aircraft avoidance;
- Measured significant decreases in nitrogen dioxide (an Environmental Protection Agency criteria pollutant) near the surface in the United States and Europe between 2005 and 2007, while observing increases over parts of Southeast Asia.

"Aura has proven to be the most comprehensive chemical laboratory orbiting 700 kilometers above the Earth," said Karen Okawa, Aura program manager for Aerospace Systems. "The measurements gathered by Aura are helping scientists better understand environmental phenomena that directly impact life on Earth. Aura has demonstrated the on-orbit reliability characteristic of Northrop Grumman-built spacecraft and is capable of performing its

mission through 2016 and possibly beyond."

Aura project scientist Dr. Anne Douglass noted, "The four instruments carried by Aura have successfully met the mission goals by continuing to track the stratospheric ozone layer, by obtaining exciting new information about the processes that control tropospheric pollutants and by providing data needed to discern the relationships between tropospheric aerosols, water vapor and ozone to climate change."

Northrop Grumman was awarded a contract by NASA in 1995 to build two Earth Observing System (EOS) spacecraft, Aqua and Aura. Aqua and Aura were based on a modern common spacecraft bus design,

experience in building and operating scientific instruments and spacecraft for remote sensing missions," said Bob Burke, vice president for Civil and Military Systems. "We brought this expertise to an operational program, the National Polar-orbiting Operational Environmental Satellite System, and we are applying it on current initiatives and look forward to applying it on future missions."

Once launched, Aura joined NASA's "A-Train," a formation of environmental satellites, including Aqua, Cloudsat, CALIPSO (Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation) and PARASOL (Polarization and Anisotropy of Reflectances for Atmospheric


# An A U R A o f S u c c e s s

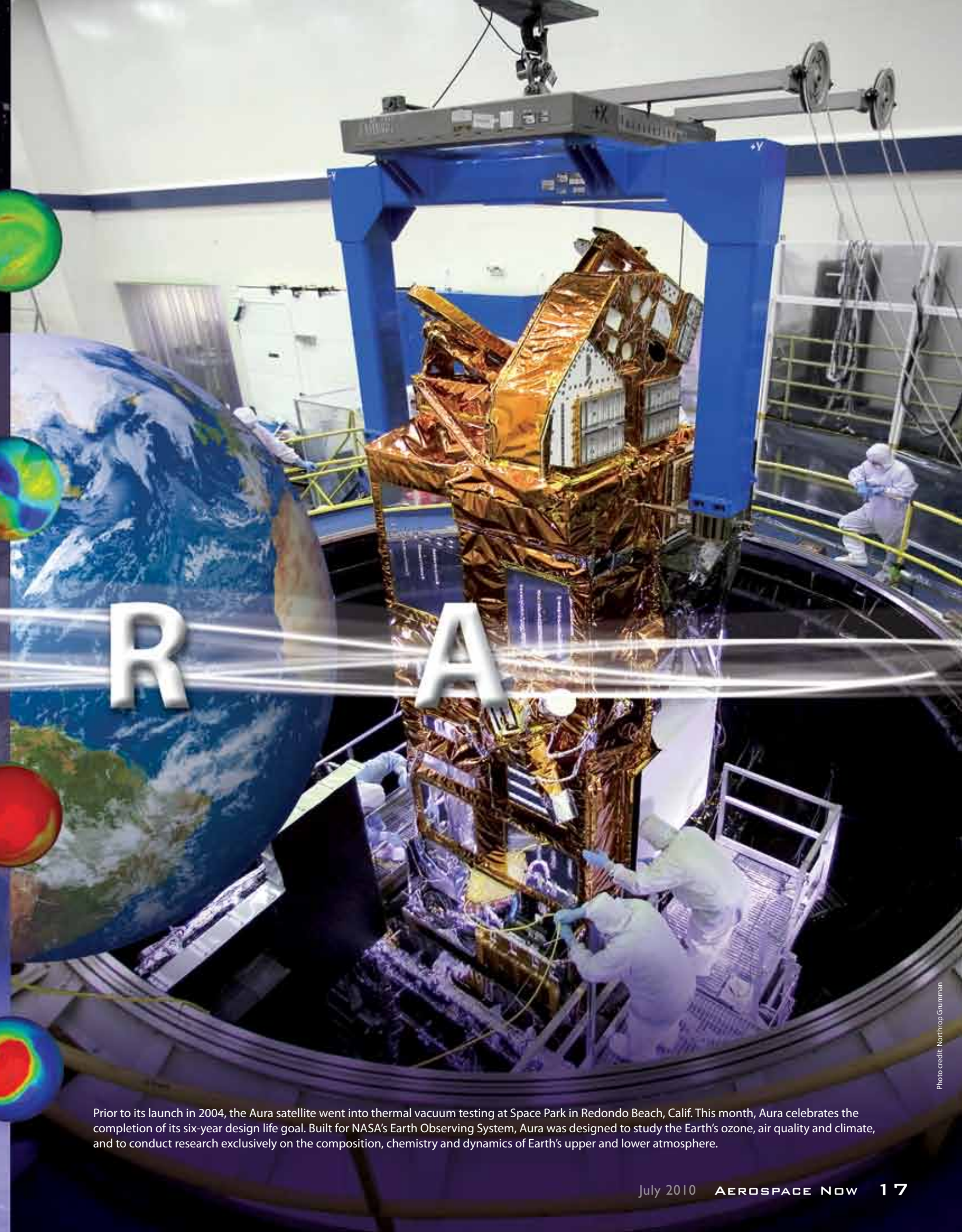
a modular, standardized spacecraft that featured precision pointing for scientific and remote sensing payloads. Other features included composite lightweight structures that allowed for payload maximization; titanium support structures for instrument accommodation flexibility; and a data bus design that facilitated science data storage and efficient real-time science data transmission to end users. Each spacecraft was outfitted with mission-specific, NASA-provided sensors.

Aqua was built first and launched in 2002, enabling engineers to apply the lessons learned to the second spacecraft, Aura. As a result, Aura's integration and test span time was half that of Aqua. Its instruments were integrated in one-third the time, and it encountered one-fifth the technical discrepancies as Aqua.

"The years spent developing Aqua and Aura greatly enhanced our decades of

Sciences coupled with Observations from a Lidar), flying over the equator at approximately 1:30 p.m. daily to gather global environmental data. Aura was the caboose. The strategy driving the A-Train was to use data gathered at the same time from several different satellites to obtain comprehensive information about atmospheric components or processes. This technique answers many more questions than would have been possible from any one satellite taken alone at different times.

Aqua and Aura were also part of a larger program, known as Mission to Planet Earth, in the early 1990s and later as the EOS program. NASA's idea was to focus on the environment in an integrated fashion, helping in the development of new solutions for ozone depletion, global climate change and acid rain. The last of the Earth-observing satellites are expected to complete their lives by the middle of this decade. 



Prior to its launch in 2004, the Aura satellite went into thermal vacuum testing at Space Park in Redondo Beach, Calif. This month, Aura celebrates the completion of its six-year design life goal. Built for NASA's Earth Observing System, Aura was designed to study the Earth's ozone, air quality and climate, and to conduct research exclusively on the composition, chemistry and dynamics of Earth's upper and lower atmosphere.

## Happy Days



### New Town Facility Gearing up for 40th Birthday

#### TOM HENSON

Not everyone celebrates a 40<sup>th</sup> birthday, but one of our teammates is going all out during the second half of 2010 to mark this milestone. The New Town, N.D., facility reaches the big 4-0 this year, and the site has planned two big events to recognize four decades of providing cables and harnesses crucial to Aerospace Systems' programs.

An event honoring employees, former employees, families and a few dignitaries is set to kick off Aug. 6. But that's just the beginning. Oct. 5, the site's actual birthday, will see an open house celebration that will include the community.

"We're a big part of New Town and North Dakota, and the community has been very good to us over the years, so we're looking forward to saying 'thank you' to everyone for being such good neighbors for the past 40 years and to looking ahead to the next 40," said Bryan Fluhrer, site manager for the New Town facility.

As important as the operation is to the area, it's been equally critical to the

company's programs through the years.

In 1970, the operation started as Northrop Corp.'s Electronics Division, and employees made electronic systems to monitor the engine health of aircraft such as the F-14, A-10 and F-117. Today, you'll find New Town's handiwork in the wires that connect controls and systems in such platforms as the F/A-18 and RQ-4A Global Hawk.

You've heard of "fly-by-wire?" These folks make the wire.

The number of wires and harnesses needed for platforms varies and depends a great deal on the statement of work. For instance, many connectors may contain up to 100 wires, but one harness in an F/A-18 contains 1,100 wires. And, while New Town employees build 56 harnesses for the F/A-18, they're responsible for the wiring of the whole Global Hawk platform, which adds up to 350 harnesses per aircraft.

CONTINUED . . . on Page 31 

## Self PORTRAIT



Photo courtesy of NASA

NASA astronaut Garrett Reisman, a former Northrop Grumman Corp. employee, takes a self-portrait visor while participating in the first of three spacewalks scheduled for the Atlantis crew and their Expedition 23 hosts. Reisman flew onboard Shuttle Atlantis STS-132 in May. On his journey to outer space, Reisman took a flag commemorating Israel's first astronaut, Ilan Ramon, and the scholarship fund established in his honor. *Aerospace Now* will feature a full story about Reisman in an upcoming edition. Stay tuned. 

# Hearing from the Hill



Pictured (l-r) are WEDLI President Dr. Anne-Marie Scheidt, director of economic development, State University of New York-Stony Brook, Congressman Steve Israel, Congressman Tim Bishop and Battle Management and Engagement Systems Sector Vice President and General Manager Pat McMahon.

## Women Economic Developers of Long Island Host Congressional Leaders

#### DIANNE BAUMERT-MOYIK


New York congressmen Steve Israel and Timothy Bishop recently addressed more than 125 leading businesswomen from across Long Island and shared their views on the state of the national and regional economy. Hosted by the Women Economic Developers of Long Island (WEDLI) and sponsored by Northrop Grumman, the annual legislative reception gave the federal leaders the opportunity to talk about issues important to them and to business leaders, including clean energy technology, improving our nation's infrastructure, health care and education.

"Long Island went from pumpkin and potato farms in the early 20<sup>th</sup> century to winning World War II, putting a man on

the moon and building the aerospace and high-technology industry we have today. Now we have a chance to create our clean energy future — a new energy economy to turn Long Island into the clean jobs capital of America. It is something I am very focused on," Israel said. The congressman, who serves on the House Appropriations Committee and formerly served on the House Armed Services Committee, has led the national effort for energy independence for much of his five terms in Congress. Israel was a keynote speaker at the E-2D Advanced Hawkeye Industry Day held in Washington, D.C., this past spring.

Bishop, who serves on the House Transportation and Infrastructure, Education

and Labor, and Budget committees and was elected to the House in 2002, strongly advocated for federal investment in the nation's infrastructure. "We're trying to build a 21<sup>st</sup> century economy on a 20<sup>th</sup> century infrastructure," he said. "The federal government needs to lead the way when it comes to this type of investment — it will also help to create tens of thousands of well-paying jobs."

Battle Management and Engagement Systems Sector Vice President and General Manager Pat McMahon serves on the board of WEDLI. 

# CREATING A CULTURE OF PERFORMANCE

*Gary Ervin's Visit to Rancho Bernardo Site Strengthens Connections among Employees*



Photo by Terry Pirrang

## RICK WILSON


Maintaining and growing Northrop Grumman Corp's competitive edge in the defense and space industry will require collaboration and employee engagement within the work force. That was Aerospace Systems President and Corporate Vice President Gary Ervin's message to employees at the Rancho Bernardo site in San Diego, Calif. Ervin visited the Unmanned Systems Development Center, where he was a guest speaker for the Cultural Connections Employee Resource Group (ERG). ERGs help keep employees fully engaged and inspired, which contributes to a healthy environment of diversity and inclusion, Ervin noted.

Ervin provided an inspirational presentation on the importance of "Creating a Culture of Performance" in maintaining our

bottom-line performance with top-line growth. He shared the Aerospace Systems vision and emphasized that our primary purpose is to be "a leader in preserving freedom," accomplished through performance in providing quality and innovative products to our customers. One of our greatest assets in accomplishing our business objectives is people, Ervin said. In conjunction, our diverse work force makes us more competitive and stronger in our industry. Providing an environment where everyone feels included increases creativity and productivity, and thereby our performance will be greater and stronger, Ervin said.

Ervin praised ERGs like Cultural Connections for their benefit to employees and the company. He stressed that by raising our performance to new heights and

focusing on our shareholders, customers, employees and communities, Northrop Grumman will continue to be a strong contender in our industry. Along with its Executive Guest Speaker Series, Cultural Connections promotes diversity and inclusion through employee professional development, recruitment/retention, networking and community outreach.

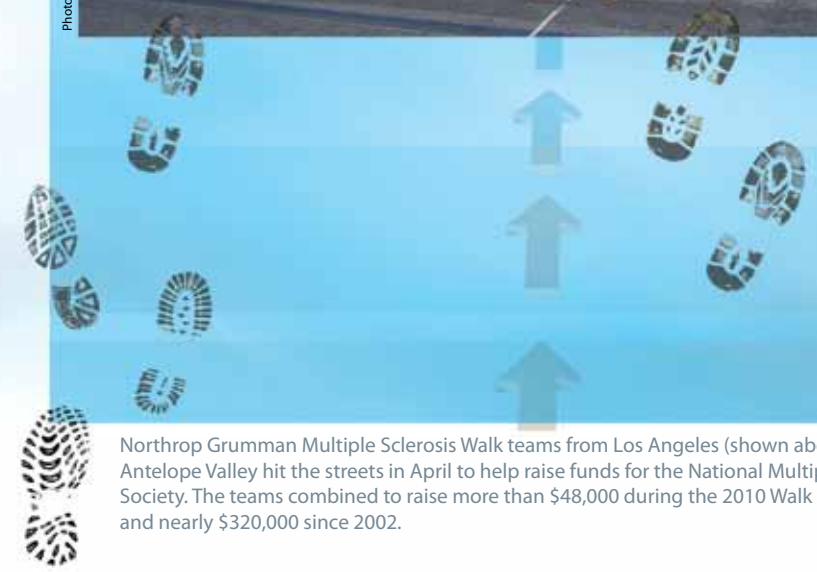
Ervin spent the remainder of the day touring the unmanned systems facility and participating in question-and-answer sessions with small groups of employees working on various programs at the site. He concluded the day by speaking at a corporate-wide Connect1NG ERG event hosted by Information Systems at one of its San Diego facilities. 

# SOLE FIGHTERS

Multiple Sclerosis Fundraising Takes a Big Step Forward



Photo by Dennis Bradley



Northrop Grumman Multiple Sclerosis Walk teams from Los Angeles (shown above) and Antelope Valley hit the streets in April to help raise funds for the National Multiple Sclerosis Society. The teams combined to raise more than \$48,000 during the 2010 Walk MS campaign and nearly \$320,000 since 2002.

## EDWARD LEVY

Taking their fight to the street, Northrop Grumman employees from across Southern California joined thousands at Pasadena and Antelope Valley, Calif., Walk MS events in April to celebrate the movement to end multiple sclerosis (MS). Fundraising efforts in El Segundo and Palmdale helped raise more than \$48,000 for research and programs designed to treat and eventually cure MS.

"We had an outstanding fundraising year and a lot of new walkers, which is an encouraging sign for the future," said Los Angeles team captain Debbie Speckmeyer. "It's a touching experience to witness the many families who come out to walk together for this cause."

With nearly 400,000 U.S. citizens living with MS, and about 200 more people diagnosed every week, the fight to defeat the disease


often impacts people on a very personal level. "Many are walking for family, friends or a co-worker who has MS," said Michelle Webb, Antelope Valley team captain. "Multiple sclerosis, like many other diseases, seems to touch all our lives in one way or another." Speckmeyer is one of those who has taken the fight against MS personally for more than 20 years now. Her support and commitment to MS fundraising started when a good friend and former co-worker, Robin Eagan, was diagnosed with the disease. Since then, this former President's Award winner has coordinated fundraising efforts and captained Walk MS teams that have raised hundreds of thousands of dollars to help the National Multiple Sclerosis Society.

MS results in a breakdown of the conductive tissue in the brain and spinal cord, making communication difficult between the

two. Symptoms can include a wide range of neurological disorders, such as hypersensitivity, loss of balance and motor control, and problems with vision and speech.

While fundraising for this year's campaign exceeded expectations, planning is already under way for next year's campaign.

"This is no time for us to rest on our laurels," Speckmeyer said. "The disease never takes a break, and neither will we until we completely wipe it out. Our team has already started planning for 2011 and our goal is to surpass this year's fundraising totals."

The cause of multiple sclerosis is still unknown, and there is no known cure. New drugs continue to become available to slow the progression of the disease, but it's the hope that through fundraising activities like the MS Walk to fund research and support programs, a cure will someday be available. 

# BORN TO MODEL

## DEBBIE BOHACS

St. Augustine, Fla., employee Jose Gonzalez's life began with a connection to aircraft — on the day of Jose's birth, instead of pacing in the waiting room, Jose's dad was at a field, flying a remote-controlled airplane. Today, Gonzalez is a prototype detail parts specialist and heat treat specialist on the manufacturing floor at the St. Augustine Manufacturing Center, and he's an avid fan of remote control aircraft. Gonzalez took it one step further by combining his work skills with the hobby and creating an authentic mini replica of the F-5.

The St. Augustine team, including Gonzalez, performs a variety of operations on the F-5, including modifications and periodic maintenance. One of the most enduring military aircraft designs ever introduced, the F-5 is an agile, highly maneuverable, reliable supersonic fighter, combining advanced aerodynamic design, engine performance and low operating costs. For the past decade, Northrop Grumman has been under contract to the U.S. Navy to perform depot level maintenance for the Navy's fleet of F-5 aircraft, providing structurally sound planes that will operate safely.

Gonzalez's personal fleet of about 25 remote-controlled aircraft included an F-5.

"The F-5 model is light, strong and its

all-foam construction is incredibly easy to repair," Gonzalez said. "The model kit comes 90 percent complete. All I had to do was glue on the wings and stabilizers, install the retractable landing gears and radio gear and insert a lithium polymer battery. It can then be flown at scale speeds in excess of 100 mph utilizing its ducted fan."

What struck Gonzalez the most was the aircraft's paint scheme.

"The aircraft model arrived white with the Swiss air team colors, but I knew immediately that the plane was destined to be painted the colors that we use here in St. Augustine," Gonzalez said.

Once the model was painted, Gonzalez worked with his manager at the time, Sherman Wells, ITAR (International Traffic in Arms Regulations) and the customer, who was intrigued and flattered enough to allow Gonzalez to take a photo of the aircraft with the model.

Gonzalez, a 14-year Northrop Grumman employee, is a member of the Academy of Model Aeronautics (AMA), a national organization with more than 150,000 members. He plans to help restart the St. Augustine Northrop Grumman Recreational Club for remote control


hobbyists and is hoping to meet with local county commissioners to talk about setting up a remote control flying field.

"Flying model aircraft can be dangerous without education and the proper facilities," he said.

"I'm hoping the county will consider donating land for an AMA-

sanctioned remote control airpark. The AMA has a membership program, which is all about safety and education, that provides support with all aspects of model aircraft and other vehicles. I've been a member since 1975."

In addition to Gonzalez, there are at least a dozen others at the St. Augustine site who are radio control advocates. The group is interested in creating a Northrop Grumman community presence that advocates safety and education when using remote control aircraft while having fun at the same time.

A father himself now, Gonzalez shares his passion with his 3-year-old son as his dad did with him — although he was there with his wife when Jose Ricardo was born! 



St. Augustine, Fla., employee Jose Gonzalez displays the remote control mini F-5 Tiger next to a U.S. Navy F-5.

Photo by Frank Maze

## F-5 Modification Work Inspires Hobby

# BEST OF THE



Photo by John Boles

LISA Award winners pictured (l-r) are: Steven Carnesi, director, XHawk Advanced Development Center; Jim Culmo, vice president for Airborne Early Warning (AEW) programs; Steve Cento, Automated Conflation Service (ACS) team; Nicole Fowler, E-2 In-A-Box Simulation Environment team; Pat McMahon, sector vice president and Battle Management and Engagement Systems Division general manager; Jeff Owenburg, Open Architecture Collaboration Center team; Bob Jankowski, ACS team; and Stan Zoubek, chief engineer, AEW programs.

# LISA BEST LISTnet

Long Island Software & Technology Network

## Team Members Honored as Long Island Leaders and Innovators

### SUSAN WETZEL

Northrop Grumman's longstanding reputation for providing innovative systems, products and solutions came shining through May 5 when 17 members of its Aerospace Systems team were honored by the Long Island Software and Technology Network (LISTnet). Team members received three Long Island Software Awards (LISAs) and a LISA leadership award at a ceremony held at the Garden City Hotel in Garden City, N.Y.

"The Oscar is the highest honor for the motion picture industry; national prime time programming awards the Emmy; the recording industry awards the Grammy; and Broadway's highest honor is the Tony. Here, being honored with the LISA award is recognition that your software product is world class while being produced on Long Island," said LISTnet President Peter Goldsmith.

Among the winners was keynote speaker Pat McMahon, sector vice president and general manager of Battle Management and Engagement Systems Division. McMahon was one of two recipients of the LISA Business Leader Award, which honors those individuals who have risen to the top by promoting the Long Island technical community.

McMahon said she was privileged to receive the award and was proud of the recognition bestowed on her Northrop Grumman teammates. "I believe their success tonight is a very strong indication of the outstanding talent that we have at Northrop Grumman, and it is really terrific when organizations like LISTnet recognize them for their achievements," she told an audience of more than 300 guests.

McMahon went on to convey the integral role Northrop Grumman's Bethpage site plays in our nation's security and intelligence. "Since December 1929, when Leroy Grumman

first incorporated Grumman, and now, 80 years later as Northrop Grumman, our mission has, and always will be, to provide our warfighters with the best weapon systems — systems that are designed to help our troops complete their mission and return safely home to their families," she said. "So today in Bethpage, we are focused on how to make these systems even more powerful and more effective at seeing what's moving in the air, on the ground or undersea."


McMahon shared Northrop Grumman's commitment to energizing young people about future careers in technology by talking about its NextGen Engineer Program, which focuses students on science, technology, engineering and mathematics (STEM). "We concentrate on both middle and high school students. We visit schools and have programs at our facilities. We support Long Island's FIRST (For Inspiration and Recognition of Science and Technology) robotics team, and our employees volunteer time and mentor these students," McMahon said. "We fund a scholarship program and offer an internship with it. We often talk about the brain drain and Long Island's young people leaving the island. This is a great way to get them to stay." She also challenged other Long Island companies to do the same and to get involved in order to build a strong talent pool for the next-generation, high-tech work force.

Also attending the event to accept the award for software development were Steven Carnesi, director, XHawk Advanced Development Center; Jim Culmo, vice president for Airborne Early Warning (AEW) programs; Steve Cento, Automated Conflation Service (ACS) team; Nicole Fowler, E-2 In-A-Box Simulation Environment

(E2IAB) team; Jeff Owenburg, Open Architecture Collaboration Center team (OACC); Bob Jankowski, ACS team; and Stan Zoubek, chief engineer, AEW programs.

Those who were honored but unable to attend are: Pete Brennan (ACS); William Chu (OACC and E2IAB); Michael Kibler (OACC); Michael Yackavage (OACC); Thomas Joy (OACC); Kevin Daugherty (OACC); Fiorino Grascia (OACC); Julie Becker (E2IAB); Jennifer Bracciodieta (E2IAB); Debbie Brittell (E2IAB); Julie DeSalvo (E2IAB); and Jonathan Uss (E2IAB).

Melville, N.Y.-based LISTnet is a nonprofit organization whose goal is to promote Long Island as one of the national centers of excellence for software and technology solutions. By facilitating the collaboration between high-technology companies and establishing networking forums and events for the exchange of information, the organization aims to nurture the growth of Long Island software and technology companies and increase business for every LISTnet partner. The annual LISA awards are presented by LISTnet to recognize excellence in software development and to honor individuals who have promoted the Long Island technical community. This year, 19 companies, as judged by Stony Brook University's Computer Science department, received the LISA award for software developed on Long Island, and two individuals were honored for their exemplary leadership role in promoting technology growth on the island.

According to Goldsmith, "Long Island has top technical companies producing state-of-the-art products that can compete with anyone." Apparently, Northrop Grumman is one of them. 

# KEEPING the CUSTOMER SATISFIED



Department of Defense Honors Maritime and Tactical Systems Team



Littoral Combat Ship Mission Package Integrator team pictured (l-r): Erzi Czifra (Information Systems, IS), Ken Sulek (IS), Pete Kopfer (IS), Dwight Dew (IS), Mary Ford (IS) and Marc DeBlasio (Aerospace Systems).

## SUSAN WETZEL

The Littoral Combat Ship (LCS) Mission Package Integrator (MPI) team within the Maritime and Tactical Systems (M&TS) integrated product team (IPT) was recently acknowledged by the Department of Defense (DoD) for its exemplary work at exceeding customer satisfaction. The team earned its fourth consecutive 100 percent award fee from the U.S. Navy's PMS 420 program office and received an award for its support of the Mission Package Support Facility.

Northrop Grumman is the Navy's LCS MPI, responsible for the successful integration of mission package components that are selected by the Navy and produced by various companies nationwide. PMS 420 is the Navy's mission module program office that heads up the LCS MPI effort.

Despite a number of challenges, Aerospace Systems secured the entire PMS 420 award fee, which was for the six-month period ending Jan. 4, 2010. "Along with volatility typical of emerging lab prototypes and equipment not fully matured, the LCS MPI program also faced the prospect of early deployment of LCS-1, the *USS Freedom*," said Marc DeBlasio, Northrop Grumman's program director of LCS MPI. "I believe we achieved top customer satisfaction by exceeding expectations across all IPTs, demonstrating quick responsiveness to constant changes in customer plans, responding agilely to changing direction and offering innovative solutions."


DeBlasio explained that the team used discretionary funds for a mission package computing environment in its Bethpage, N.Y., lab to demonstrate new ideas for using virtualization to improve operations and reduce space, weight

and power requirements.

Since the program's inception in early 2006, the team has achieved five of eight possible 100 percent award fees with ratings of only "dark blue" (exceptional) and "purple" (very good) on the customer's contractor performance assessment reports.

In addition to the 100 percent award fee, the U.S. Navy selected the LCS MPI team as the winner of a program/project award as part of its fiscal 2009 DoD Value Engineering Achievement Awards. In a May 12 ceremony at the Pentagon, Northrop Grumman LCS MPI Logistics team members Dwight Dew, Gary Haines, Pete Kopfer and Jeff Niedenthal, along with their government counterparts, were acknowledged for their achievements in the application of value engineering: a functional analysis process used to identify actions that reduce cost, increase quality and improve mission capabilities across the entire DoD enterprise.

M&TS has asserted itself as the LCS MPI leader and with these recent successes has positioned itself to win future LCS MPI roles. High customer satisfaction ratings have driven major growth, evidenced by the recent sole-source request for proposal for low rate initial production mission packages, which will more than double sales of core services this year. Also, the Navy assigned the MPI as the lead in the standup of a government/industry systems engineering integration team IPT this year.

DeBlasio said that his team will not let up now. "We will continue with excellent performance for our customers and Northrop Grumman Corp. stakeholders to maintain our exemplary record," he added. 

# They Are the CHAMPIONS



Shown here (l-r) is the winning team from Beach Cities Robotics (FIRST Team 294): Jen Sharp (kneeling); Karen Izumoto (kneeling); Forrest Kim; Alek Munoz (kneeling front); Wiley Davis (kneeling); Ricky Wedeen; Andrew Keisic (mentor, kneeling); Robbie Gleichman; Nighelles David; Dave Ansari (mentor, kneeling, holding banner); Fintan O'Grady; Matt Steiger; Ryan Sharp (kneeling, team captain); Alex Davis (kneeling); Peter Johnson (mentor); Ken Sterk (mentor); Cindy Sharp (crouching, parent mentor); Rick Sharp (parent mentor); and Rick Wagner (mentor). The drive team consisted of Ryan Sharp (driver); Anton Schuetze-Coburn (co-driver, not shown); Robbie Gleichman (human player and programmer); and Andrew Keisic (adult coach). Hidden completely behind Forrest Kim is mentor and team coordinator Andrea Wagner.

## Northrop Grumman Helps Students Win Top Honors in Robotics Competition

### KIMBERLY PRATO AND RICK WAGNER

A Northrop Grumman-sponsored, competitive high school robotics team, Beach Cities Robotics (BCR, Team 294), won the FIRST (For Inspiration and Recognition of Science and Technology) worldwide robotics competition in Atlanta April 17.

Prior to the championship victory, BCR won two awards at the Los Angeles Regional Robotics Competition. BCR won the "Innovation in Control" Award for a ball grabber and kicker head-up display and control system. The silver medal and winning trophy were on display in the Mechanical Integration and Test Center at Space Park in Redondo Beach, Calif. BCR also received the "Coopertition™" (Cooperative Competition) Award for its work during qualifying matches. NASA provided a webcast of the competition.

"Northrop Grumman remains a proud sponsor of Team 294 Beach Cities Robotics. For seven consecutive years at the championship in Atlanta, we have mentored and supported the community in this venue and join in the celebration of these high school students becoming world champions. We look forward to their continued enthusiasm in the disciplines of science,

technology, engineering and math," said John Daegele, sector vice president, System Engineering, Integration and Test, Northrop Grumman Aerospace Systems.


Robots must be designed to play a new and different game every year, unveiled at the annual kickoff, which is generally held on the first Saturday in January. This year's game was "Breakaway™," in which two alliances of three teams each compete by climbing obstacles, directing soccer balls into goals and hanging from towers.

After the unveiling of the game, student teams have six weeks to design, fabricate, assemble, program and test their robots. The robots must be locked in their shipping containers and delivered by the deadline, or the team does not compete. This year, more than 2,000 teams from around the world met that deadline. More than 300 high school teams met during the three-day event to compete for the right to be named world champion. The flags of 31 nations were flying in the Georgia Dome at the event.

High school robotics teams designed and assembled their robots during the annual "build season" and tested their competitive skills at regional tournaments leading up to

the championship. BCR team students and mentors logged more than 2,000 hours of work during the season. For the 12<sup>th</sup> consecutive year, BCR designed, built and shipped a competitive robot in six weeks. In total, more than 10,000 young people from more than 500 teams and 30 countries participated in the weekend competition celebrating science, technology and team building.

The competition is held annually by FIRST and was founded by inventor Dean Kamen in 1988. FIRST is a worldwide organization with the mission of changing our culture. Kamen observed that we become what we celebrate, so he founded FIRST to inspire youth to pursue education and careers in science and technology. FIRST generates excitement by using the sports model of a competition for robotics. The yearly robotics contest for high school students is the highest level of FIRST competition.

BCR wishes to thank the Northrop Grumman Office of Corporate Responsibility for sponsorship and the machinists and welders who contributed their time to helping during the six-week build season. 

# 'Green' Hornets



## Aerospace Systems Works with the U.S. Navy on an Environmentally Friendly F/A-18 Fleet

SUSAN CASABELLA

In the United States, petroleum-based fuels account for approximately 43 percent of total greenhouse gas emissions. To reach the greenhouse gas 80-percent reduction goal, alternate ways of propelling vehicles that use petroleum products are crucial. We have all heard the talk about alternative fuels for cars and trucks, but how do we achieve the goal with air transportation? Jet fuel currently accounts for almost 10 percent of the oil we use, so finding an alternative for it will be critical to achieving emission-reduction goals. Biofuels are the likely answer.

On board and leading the charge is the U.S. Navy, which has partnered with Aerospace Systems to pave the way for a greener tomorrow. "I am asking all of us to meet a very ambitious goal. Today, about 17 percent of our total energy consumption comes from alternative sources. By 2020, half of our total energy consumption for ships, aircraft, tanks, vehicles and shore installations will come from alternative sources," said Navy Secretary Ray Mabus when he spoke in October 2009 at the Navy Energy Forum in McLean, Va.

The F/A-18 Strike Fighter Program Office

at the Naval Air Systems Command (NAVAIR) is already working on making the original Hornet aircraft environmentally friendly. When Super Hornets entered the fleet in 1999, they were also known as "Green" Hornets. The green means less nitrogen oxides emissions, carbon monoxide, unburned hydrocarbons and fuel consumption without compromising engine performance attributes such as thrust, weight and cost.

Enter biofuels derived from algae and oilseeds of the *Camelina sativa* plant, which needs little water or nitrogen and grows in marginal soil. Biofuels will be used in the Navy's "Green" Hornet and Green Ship initiatives. These will be the first liquid alternatives to petroleum, derived from a biomass compound, to be certified for future use. The first Navy aircraft engine to run on biofuel was successfully tested in October 2009 at the Naval Air Warfare Center Patuxent River, Md. "The engine reacted the way we had expected," said NAVAIR's Rick Kamin, who is the Navy's Fuel Team lead. "It did not know the difference."

First flight of the Navy's F/A-18 "Green"

Hornet took place this year on Earth Day, April 22. The *Camelina sativa*-based biofuel is blended in a 50-50 mix with standard jet fuel. "The eventual goal for the Navy is to be able to use fuels derived from non-petroleum sources without having to blend them with petroleum-derived fuels," Kamin said.

Since their inception, aircraft have been developed around petroleum-based fuels. Although renewable fuels currently being tested have many similar properties to those that are petroleum-based, they are not identical. Blending is the near-term solution until ongoing research provides a completely green fuel. Of particular concern are aromatics, a class of ring-shaped hydrocarbon molecules that includes benzene, found in standard jet fuel. Aromatics soak into the seals and make them swell, ensuring a tight fit against the metal. "Self-sealing fuel bladders, for example, need aromatics to work properly," Kamin said.

Research and development continue on a push toward an ambitious goal. The Navy/Boeing/Northrop Grumman team is moving forward, full force, toward a greener F/A-18 and a greener future for us all.



## City and Site Promote Green Building Materials

Surrounded by fellow City Council members, El Segundo Mayor Eric Busch (center) presented a proclamation to Aerospace Systems representatives (l-r) Christina Kull, El Segundo greeNG; Ron Holliday, Aerospace Systems Environmental, Safety, Health and Medical director (holding certificate); and Jim Hart, Aerospace Systems manager of External Affairs (directly to Holliday's right) for sponsorship of the green building kiosk in El Segundo City Hall.

CHRISTINA KULL

Standing tall in the El Segundo, Calif., City Hall, the green building kiosk contains a wealth of information for El Segundo residents and businesses. It also bears a dedication plate from one of Northrop Grumman Aerospace Systems' sites, located just down the road from City Hall for more than 30 years.

The display not only teaches others how to be green but also leads by example. Made of sustainably harvested maple certified by the Forest Stewardship Council and spray finished with low-VOC (volatile organic compound), water-based Polyureseal, the display also features samples mounted with low-VOC adhesive and text printed on recycled-content paper. Nonprofit environmental consultant Ecology Action built the display.

The display encourages builders and remodelers to "Save Money, Be Healthy,

Live Comfortably, Reduce Maintenance and Protect the Environment." In addition to providing information about how to do this in a "green" fashion, the display includes samples of typical eco-friendly materials.

One tactile example of how going green can save you money and divert waste is the kiosk display of a concrete slab containing a high concentration of fly ash. This display demonstrates how coal power-plant waste can reduce the need for costly cement by 50 percent. Another example is the Metacrylics seamless acrylic polyester roof system, similar to the cool roofing materials installed on top of all Aerospace Systems El Segundo buildings to reflect solar radiation in the summer, lock in heat in the winter and greatly decrease heating and cooling costs — up to 19.5 megawatts of electricity on high-demand summer afternoons.

Earlier this year, Ron Holliday, director of

Environmental, Safety, Health and Medical for Aerospace Systems, accepted a proclamation from the El Segundo City Council presented by Mayor Eric Busch.

"Northrop Grumman has been doing business in El Segundo for 34 years, and we're proud to be an environmental partner with the city," Holliday said. "We hope this informational kiosk will help people learn how to build and operate their homes and businesses more efficiently and in an environmentally friendly manner."

*Are you looking for ideas on how to green your build or remodel? Drop by the El Segundo City Hall at 350 Main St., El Segundo, Calif., 90245, e-mail [Christy.Kull@ngc.com](mailto:Christy.Kull@ngc.com) for a copy of the green building kiosk suggestions or visit <http://greeNG.as.northgrum.com> (click on El Segundo, then Meeting Notes).*

# Abundant Alternative

## Using Solar Power to Meet Our Growing Needs

SUSAN WETZEL

Few would argue that advancements in technology have brought us great things. It's hard to even imagine a time when there were no computers, microwave ovens, big-screen plasma TVs, cell phones or refrigerators that not only serve water but also make, chop and dole out ice. Multiple-car families — with at least one SUV or truck — seem to be a norm, and gas-fueled lawn mowers, snow blowers and power-washers are commonplace in many households. Not surprisingly, this technology explosion, which has taken place during the last few decades, has had a major impact on our society's energy consumption. With each new "toy" invented, the amount of energy consumed per person, per home, per country has increased.

Transportation, as well as the steady increase in the Earth's population, has played a major role in impacting energy use. Consumables travel an average of 1,500 miles to get to grocery stores and even farther to reach soldiers in the field. In addition, nine out of every 10 calories eaten come from oil that is used in the production of fertilizers and insecticides. Without oil or a substitute, only about 25 percent of the world's population could be fed.

Since the major part of our current energy needs is supplied by nonrenewable, exhaustible energy sources like oil, coal and natural gas, experts believe that eventually these resources will become very difficult to obtain and will simply cost too much to acquire.

Dr. Theodore Hilgeman is a senior technologist in Technology Development for Aerospace Systems in Bethpage, N.Y., who has studied alternate energy solutions for 10 years. "The world is running out of cheap energy, as exemplified by our increasingly expensive oil supply," he said. "This will affect all levels of society globally. Our food, transportation, homes and military defense are all dependent on an inexpensive, efficient and available supply of energy."

The other choice, he said, is to turn to sustainable forms of energy that meet these requirements.

Aerospace Systems is considering one such alternative: space solar power. Its Individual Space Power System exploits the fact that sunlight is an almost inexhaustible resource with 99 percent availability. The wireless transmission technology, which was originally conceived by Hilgeman, uses solar panels in space to convert sunlight into electricity, which then is converted into microwaves that are beamed down to Earth at a safe power level. Once on Earth, the power is converted to useful electricity by scalable rectennae — transportable, rapidly erectable antennae that can be small and lightweight.

The system will have both military and humanitarian applications. Soldiers in the field can carry the rectennae in their backpacks and pick up enough energy to charge a cell phone battery. This will eliminate

the heavy battery packs currently carried and avoid the need for fuel convoys to run electric generators, which currently take up about 70 percent of the convoy traffic in Iraq. It also will allow for power to be brought to temporary military sites not equipped to deliver wired power. In humanitarian applications, it could supply electricity to devastated areas hit by earthquakes, tornadoes or tsunamis by providing base power to restore communications.

The first phase of the program is targeted to develop microwave-beamed power from one point to another on the ground. The second phase will make use of the International Space Station as the powered platform.

According to Hilgeman, solar energy is our only reasonable alternative. "Ultimately, we will have to turn to the sun if the world's population is to be maintained," he said.



Above: Pictured is an artist's conception of rectennae, erected on the ground, transmitting power to a rectenna installed on the roof of the Methodist Hospital in New Orleans, La., after Hurricane Katrina. Power received is enough to run an emergency operating room.

Below: Space solar panels convert sunlight into electricity, which then is converted into microwaves that are beamed down to Earth. Once on Earth, the power is converted to electricity useful to soldiers and entire brigades.



BRIAN SCHOENING

Greg Wiehe and Ray Enriquez show off greeNG T-shirts they received for exemplary support of Earth Hour 2010 at Space Park in Redondo Beach, Calif., by ensuring every light in Building E-2 was shut off for one hour. Both veteran electricians at Space Park, they represent 46 years of collective Northrop Grumman service.

Their favorite green activities are the company-sponsored waste recycling events. "We all have 'stuff' at home that can be recycled properly. Hosting these events on-site makes it easy," Greg said.

Wiehe and Enriquez have been involved with many of the energy programs. "Space Park has been installing time clocks, motion sensors, CFLs (compact fluorescent light bulbs) and efficient fluorescent lamps for years," Ray said. The duo's greeNG tip: "Go solar! Take advantage of the many programs available to offset installation costs, but don't forget to conserve first."

Know an employee who deserves to be recognized for their green efforts? Submit your nomination to [Christy.Kull@ngc.com](mailto:Christy.Kull@ngc.com).

NEW TOWN continued from Page 18 . . .

"New Town is a build-to-print facility, and they do what they do very well," said Don Gaw, director of production operations for Rancho Bernardo, Calif., which includes oversight of the New Town facility. Gaw notes that every F/A-18 delivery has left the site on time. "Quality is absolutely a critical part of the formula, and we're ready to offer our best work to the rest of the company's systems and platforms," he added.

The New Town facility is unique in that it sits on the Fort Berthold Reservation, which is home to the Three Affiliated Tribes: Mandan, Hidatsa and Arikara Nation. These tribes have a significant place in American history. Lewis and Clark stayed with the Mandans during the winter of 1805, when they met up with a guide named Sacagawea. A group of Arikara men were with Gen. Custer at Little Big Horn.

One hundred thirty-five employees work in the New Town facility, and some live on the reservation. At least a quarter of the team is part of the native population. New Town itself has fewer than 1,400 residents, and fewer than 7,000 people live in Mountrail County. Some employees drive as far as 70 miles to work (including during North Dakota's winter, of course).

"The work ethic here is second to none, and it always has been," Fluhrer said. "The upcoming celebrations are a good way to thank everyone for all the hard work they've done through the years, and to thank our community for being such a great partner."

### Aerospace Now Printer Committed to the Environment

Every month, *Aerospace Now* magazine does its part to protect the environment. Starting with the April 2010 issue, *Aerospace Now* began using an eco-friendly paper that is 25 percent recycled content.

Marina Graphic Center Inc. (MGC), which prints our issues of *Aerospace Now*, places a high priority on environmental protection. MGC meets and exceeds all state and federal requirements for the safe handling of all volatile organic compounds (VOC)-emitting chemicals and materials. The company also has an extensive recycling program for paper, ink, plastic, aluminum and chemicals. In addition, MGC is a Forest Stewardship Council (FSC)-certified printer, as well as an Eco-SURE Gold Tier printing facility certified by Gans Ink and Supply Co.

MGC has switched all of its solvents to Air Quality Management District-approved low-VOC chemicals. By using soy-based and low-VOC inks, MGC intends to further reduce its environmental footprint. The company also installed the Prisco Flo-Clear System to filter press fountain solution. This allows the presses to print cleaner and reduces fountain-solution replacement, thus depositing fewer chemicals into the waste stream. Finally, MGC's entire facility was retrofitted with energy-efficient light fixtures and bulbs.



# Coming Next Month

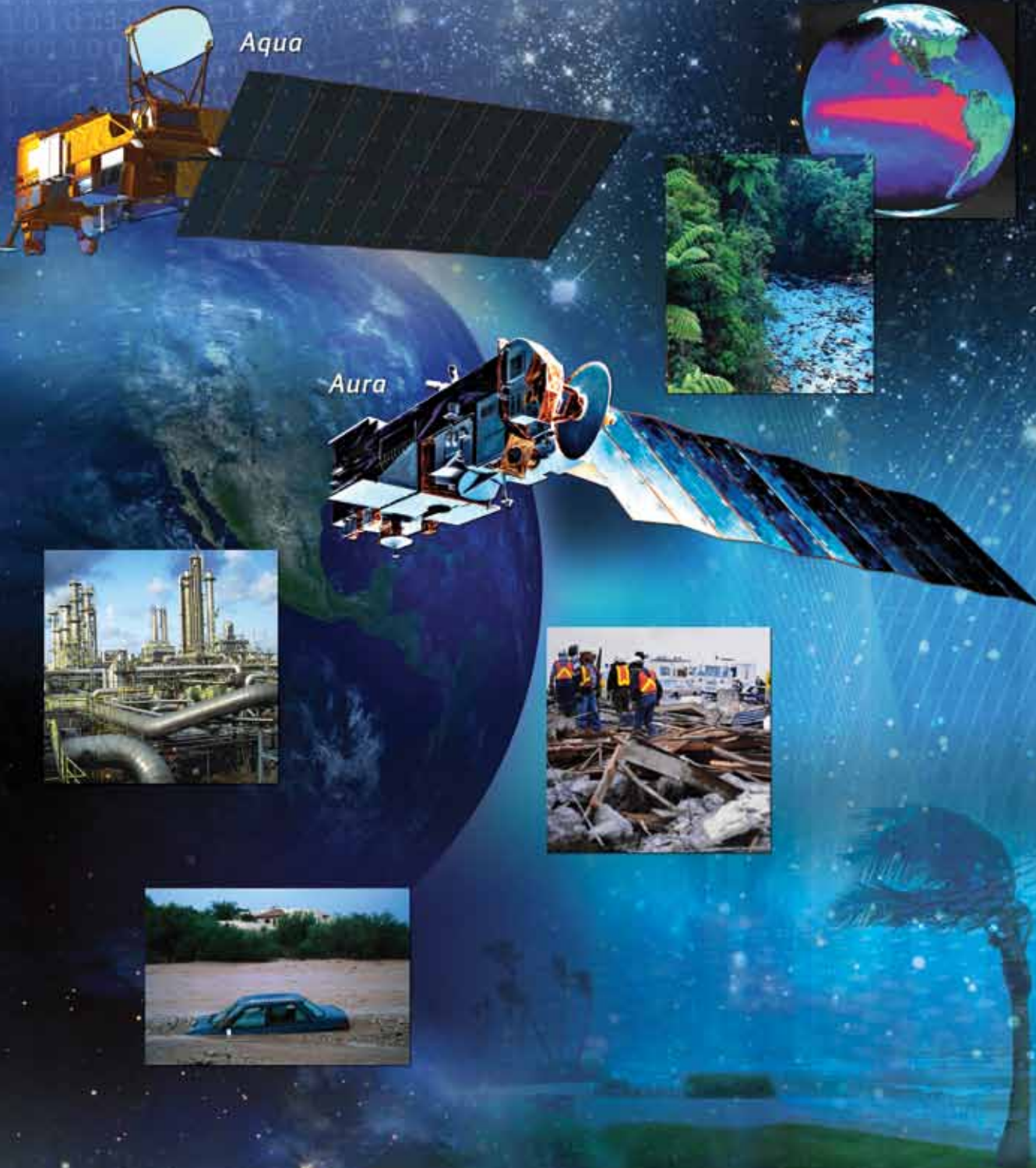
## August > History: A Path to Performance

# Coming Next Month

# Earth Observing System (EOS)

***NORTHROP GRUMMAN***

*Monitoring global change*



*Enhancing our knowledge of global weather  
and climate trends*