



# NOAA Satellite and Information Service

2007 Accomplishments





## Information

National Oceanic and Atmospheric Administration | [www.noaa.gov](http://www.noaa.gov)  
NOAA Satellite and Information Service | [www.nesdis.noaa.gov](http://www.nesdis.noaa.gov)  
Data and Information | [www.nesdis.noaa.gov/datainfo.html](http://www.nesdis.noaa.gov/datainfo.html)  
Satellites | [www.nesdis.noaa.gov/satellites.html](http://www.nesdis.noaa.gov/satellites.html)  
Education and Outreach | [www.nesdis.noaa.gov/outreach\\_edu.html](http://www.nesdis.noaa.gov/outreach_edu.html)  
Products | [www.nesdis.noaa.gov/sat-products.html](http://www.nesdis.noaa.gov/sat-products.html)  
Research | [www.nesdis.noaa.gov/star/index.php](http://www.nesdis.noaa.gov/star/index.php)  
EEO and Diversity | [www.nesdis.noaa.gov/About/Diversity/diversity.html](http://www.nesdis.noaa.gov/About/Diversity/diversity.html)  
Library Services | [www.lib.noaa.gov](http://www.lib.noaa.gov)  
Search and Rescue Beacon Registration | [www.sarsat.noaa.gov](http://www.sarsat.noaa.gov)

2007 NESDIS Accomplishments Report Acknowledgements  
Layout & Artistic Design - Marc Pulliam  
Technical Writers/Editors - Mindy Gaines, Tara Mairs  
Special thanks to the Communications Team and NESDIS Headquarters Staff for their input and review.

# From The Assistant Administrator



Dear Colleagues and Friends:

**2**007 was an important year for NOAA's Satellite and Information Service. First, we provided a record-breaking amount of data to users from our world-class data centers. Second, we saved hundreds of people with help from our satellite-based search and rescue systems. Third, 14 of our scientists were directly involved in the Nobel Peace Prize winning effort by the Intergovernmental Panel on Climate Change (IPCC) that reported to the world on climate change issues. In addition, we officially opened a state-of-the-art, award-winning satellite operations facility in Maryland to house our around-the-clock environmental satellite operations. It was quite a year!

We are dedicated to providing the best service to our data users and partners and to improving our products. Environmental data from satellites and air- and ground-based observation platforms benefit all of us in a variety of ways. Our environmental data products help individuals, city managers, political leaders, and commercial entities make better decisions about how to conduct business, monitor public health, and protect life and property. We made progress on our two future satellite programs—completing a restructure of the new National Polar-orbiting Operational Environmental Satellite System (NPOESS) program and preparing the next generation of geostationary satellites, called GOES-R, program to move into the acquisition phase. These acquisition programs are challenging, but it is worth the effort since both systems will provide improved data and capabilities to monitor the Earth.

All of our organizational accomplishments this past year were possible because of the dedication, drive, and outstanding service of the employees and team members of our organization. I am proud to be part of this organization and am excited about the possibilities of the year ahead.

Mary E. Kicza  
Assistant Administrator for Satellite and Information Services



This GOES-12 1 kilometer visible imagery, taken on August 20, 2007, shows Hurricane Dean located over the Caribbean Sea.







## Supporting the NOAA Mission

NOAA's mission is to understand and predict changes in the Earth's environment and conserve and manage coastal and marine resources to meet our Nation's economic, social, and environmental needs. NOAA Satellite and Information Service supports this mission through its current and future satellite programs and data management endeavors.

### Current Spacecraft

#### Metop-A Becomes Operational

On May 15, 2007, Metop-A, a European environmental satellite with three instruments provided by NOAA, was formally declared operational, and users started benefiting from the satellite's capabilities. The successful launch of Metop-A is a milestone of the cooperative effort between NOAA and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) to integrate European and U.S. instruments on a polar-orbiting satellite system. The goal of this partnership is to provide and improve operational meteorological and environmental forecasting and global climate monitoring services worldwide.

NOAA's Center for Satellite Applications and Research (STAR) worked closely with EUMETSAT to calibrate the satellite's instruments. Accurately calibrated measurements ensure accurate products from these instruments, including atmospheric tempera-

ture, moisture, and ozone products. The Metop series of three satellites will provide data until 2020.

### Future Spacecraft

#### Next Generation Geostationary Satellite Program Moves Forward

Geostationary satellites remain the weather sentinels for NOAA—tracking hurricanes, severe storms, and other severe weather. The next-generation geostationary satellite series, called GOES-R, will scan the Earth nearly five times faster than the current GOES, providing users such as meteorologists and government agencies around the world with about one hundred times the amount of data currently provided. In 2007:

- NOAA revised the management and acquisition strategy for the GOES-R program, partnering more closely with the National Aeronautics and Space Administration (NASA) to take advantage of each agency's expertise.

- The design of the Advanced Baseline Imager, the key instrument on GOES-R, was completed in February. The Space Environment In-Situ Suite System Definition Review was conducted at Assurance Technology Corporation in June.
- NOAA awarded the remaining three GOES-R instrument contracts; the Solar Ultraviolet Imager and Geostationary Lightning Mapper were awarded to Lockheed Martin in September and December, respectively, and the Extreme Ultraviolet and X-Ray Irradiance Sensor was awarded to the Laboratory for Atmospheric and Space Physics in August. These instruments will help users to forecast effects from solar disturbances and track lightning strikes.

### Next Generation Polar-orbiting Satellite Program Restructured

In 2007, NOAA completed restructuring the National Polar-orbiting Operational Environmental Satellite System (NPOESS) program. Under the new plan, the first NPOESS satellite will begin to collect and disseminate data on Earth's weather, atmosphere, oceans, land, and near-space environment in 2013. Polar-orbiting satellites are able to monitor the entire planet and provide data for long-range weather and climate forecasts. NPOESS will increase the timeliness and accuracy of severe weather event forecasts. A \$4.2 billion modification of the Northrop Grumman Space Technology contract culminated a rigorous year-long effort to replan virtually every aspect of this critical satellite program. The new plan includes two development satellites with an option for two production satellites.

Also in 2007, the NPOESS Preparatory Project (NPP) spacecraft completed interface testing, and instruments are now being integrated into the satellite. In addition, the Limb sensor of the Ozone Mapping and Profiler Suite was added back to NPP, and NOAA is working with the Office of Science and Technology Policy and the Office of Management and Budget to remanifest climate sensors on NPOESS or other satellites.

## Satellite Operations and Data Management and Access

### NOAA's Satellite Operations Facility Opens

The new home for NOAA's around-the-clock environmental satellite operations officially opened on June 11, 2007. This was the climax of years of planning to ensure continuity of operations during the move from the old facility. Top leaders from NOAA and the U.S. General Services Administration and several U.S. Congressional representatives, such as Senator Benjamin L. Cardin and Senator Barbara A. Mikulski from Maryland, attended the dedication ceremony.

Each day, the NOAA Satellite Operations Facility (NSOF) processes more than 16 billion bytes of environmental satellite data from NOAA's geostationary and polar-orbiting spacecraft and the Department of Defense's Meteorological Satellite Program. NOAA's National Weather Service and other agencies use these data to track severe weather, to create models for medium and long-range weather forecasts, to observe climate change, and to monitor ocean and coastal ecosystems. NSOF contains more than \$50 million



in high technology equipment, including 16 antennas that control more than \$4.7 billion in environmental spacecraft.

## Records Set for Data Delivery

NOAA's data centers, the National Oceanographic Data Center (NODC), National Climatic Data Center (NCDC), and National Geophysical Data Center (NGDC), had a very successful year with record data delivery. The centers totaled 378.60 terabytes in 2007, which is 37.8 percent higher than the 2006 total of 274.69 terabytes. This continued the rapid growth of the *in situ*, radar, satellite, and model data.

NODC maintains the largest collection of publicly available oceanographic data and information in the world, including hundreds of millions of records gathered from ocean observation programs conducted over the past 150 years. These data document the physical, chemical, and biological properties of the oceans, currents, weather, and biota, as observed from ships, buoys, and satellites. NODC provides access to these data for more than 270,000 users each year, including ocean researchers within NOAA, other agencies, and academia, environmental program managers, educators, maritime industries, and foreign communities.



NOAA's National Climatic Data Center, Asheville, North Carolina

NCDC archives billions of meteorological observations, making it the largest climate data center in the world. NCDC receives, processes, archives, and disseminates surface, marine, upper air, and model output data. NCDC serves a large and diverse community, responding to more than one million requests per year.

NGDC provides geophysical data products and services that describe the solid Earth, marine, and solar-terrestrial environment. NGDC's data holdings contain more than 400 digital and analog databases. NGDC's digital databases hold more than 20 million data records.

## New Diverse Datasets on CLASS

In 2007, NOAA began a pilot project to use our Comprehensive Large Array-data Stewardship System (CLASS), a successful online data management system, as long-term secure storage for NOAA's National Oceanographic Data Center (NODC) data archives. The aim of this project is to show that CLASS can accommodate not only large-volume satellite data, but also more diverse ocean observations and information from in-water instrumentation and numerical models. Further development of CLASS will provide significant storage capacity and new access tools for NOAA's environmental data archives. As of August 2007, NODC had sent nearly 3,600 discrete archive information packages (groups of data) to CLASS, totaling over 650 gigabytes of data. This volume represents over 8 percent of the formal NODC archive holdings.

## Improving Satellite Calibration

With so many sources of weather, climate, and environmental data and information, it is often difficult for scientists to compare several datasets because each set may be based on different reference standards. To address this issue, the World Meteorological Organization sponsored the Global Space-based Inter-Calibration System (GSICS). This new international program is coordinated by NOAA's Center for Satellite Applications and Research (STAR). In 2007, STAR helped GSICS reach a major milestone, achieving the routine intercalibration of operational instru-



ments in low Earth orbit (LEO). Intercalibrating satellite instruments results in observations that are all tied to common reference standards, thus insuring measurements from one instrument are directly comparable to those of other instruments. GSICS activities are focused on the intercalibrating operational satellites from the United States, Europe, China, and Japan. A GSICS website ([www.orbit.nesdis.noaa.gov/smcd/spb/calibration/icvs/GSICS/index.html](http://www.orbit.nesdis.noaa.gov/smcd/spb/calibration/icvs/GSICS/index.html)) has been established that includes near-real-time calibration and intercalibration information.

## **Global Earth Observation System of Systems (GEOSS)** Global Observing Systems Information Center Joins GEOSS Effort

In January 2007, NOAA's National Climatic Data Center transitioned the Global Observing Systems Information Center (GOSIC) into a fully operational global data facility. This center provides information and associated tools to facilitate better access to climate data and information. GOSIC is now working with several observing system operators and global data centers to provide more effective and efficient access to environmental datasets. This benefits decision makers, scientists, and the public by saving time, providing a consistent user interface, and offering metadata, which explains the origin of the actual data.

## **NOAA Continues Work on Global Earth Observation Efforts**

In 2007, NOAA continued to support the Global Earth Observation System of Systems (GEOSS) by enhancing GEOSS activities in the Western Hemisphere. On April 10, 2007, NOAA and the Government of Brazil publicly recognized the successful repositioning of the Geostationary Operational Environmental Satellite-10 (GOES-10) spacecraft as a significant step in the realization of GEOSS in the Americas, a Western Hemisphere initiative designed to advance the worldwide GEOSS. GOES-10 data is key to continuous weather monitoring in forecast centers and airports throughout Latin America. The applications are especially important to public health, agriculture, and the mapping of renewable energy sources.

## **GEONETCast Improves Access to Data Worldwide**

In 2007, NOAA continued its quest to further the development of a Global Earth Observation System of Systems through GEONETCast Americas, a regional GEONETCast system. GEONETCast is a low cost, global, environmental information delivery system that will improve worldwide access to satellite and *in situ* data, products, and services through the use of communications satellites. With a 24/7 data stream, GEONETCast will provide information critical to efforts such as disaster mitigation and agriculture management. NOAA is coordinating this effort with the U.S. Group on Earth Observations, European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), the China Meteorological Administration, and the World Meteorological Organization. GEONETCast began operating in November 2007. Once it is fully operational, this system will provide continuous environmental data distribution over much of North, Central, and South America and the Caribbean.

## **Monitoring Global Gas Flaring**

In cooperation with the World Bank, NOAA's National Geophysical Data Center (NGDC) used low light imaging data from the U.S. Air Force environmental satellites, called DMSP, to map the global distribution of natural gas flaring. The flared natural gas is a by-product of petroleum production that is released when oil is brought to the Earth's surface. With specialized infrastructure, it is possible to bring this by-product gas to market or to use it on site. However, many remote petroleum production and processing facilities lack this capability and flare the gas. This wastes the energy that could be derived from this commercial by-product and adds carbon dioxide to the atmosphere. If all flared gas worldwide were captured, the reduction in carbon dioxide would exceed that called for in the Kyoto Protocol. NGDC estimated a 2006 volume of 168 billion cubic meters (BCM), 27 percent of the

The report written for the World Bank, with supporting data, is available at [www.ngdc.noaa.gov/dmsp/interest/gas\\_flares.html](http://www.ngdc.noaa.gov/dmsp/interest/gas_flares.html).

U.S. natural gas consumption in that year and more than the combined natural gas consumption of Japan, China, and India. The market value of 168 BCM of natural gas in the United States in 2006 would have been \$40 billion. While Nigeria has been widely reported to have the largest volume of gas flaring, the satellite data indicate Russia's flaring volume is more than double that of Nigeria. The study, funded by the World Bank Global Gas Flaring Reduction initiative, expanded the number of countries with reported gas flaring volumes from twenty to sixty.

### NOAA Satellite and Information Service Contributes to the International Polar Year 2007-2008

The International Polar Year (IPY) 2007-2008 is a worldwide, coordinated research effort focused on the polar regions. This is the fourth polar year, following those in 1882, 1932, and 1957. IPY participants from over 60 countries are involved in research on human health, remote sensing, ecology, biodiversity,

astronomy, agriculture, economics, climate modeling, and history. NOAA Satellite and Information Service is contributing to IPY by providing experimental and operational snow, ice, atmosphere, and space products; compiling an IPY bibliography; performing research on new satellite products and data assimilation; and leading an effort to evaluate and enhance the global cryosphere (snow and ice) observing system to support development of the Global Earth Observation System of Systems. Snow and ice data are used to improve weather forecasts, manage transportation systems, assess water supplies, and predict and mitigate disasters such as avalanches and floods.

The NOAA Central Library launched the "Polar Resources in the NOAA Library Network" website, with full-text online access to over 200 historical documents and over 2,000 digital images at [www.lib.noaa.gov/collections/ipy.html](http://www.lib.noaa.gov/collections/ipy.html). This library has compiled a collection of polar information in one location to improve access to polar data useful for researching questions on climate.





## Managing Our Ecosystem

During 2007, NOAA Satellite and Information Service made significant strides in managing the Nation's ecosystems. Several of these improvements and new programs focused on supporting the Gulf Coast region, monitoring our coral reefs, and enhancing ocean science.

### Enhancing NOAA's Coral Reef Watch Products

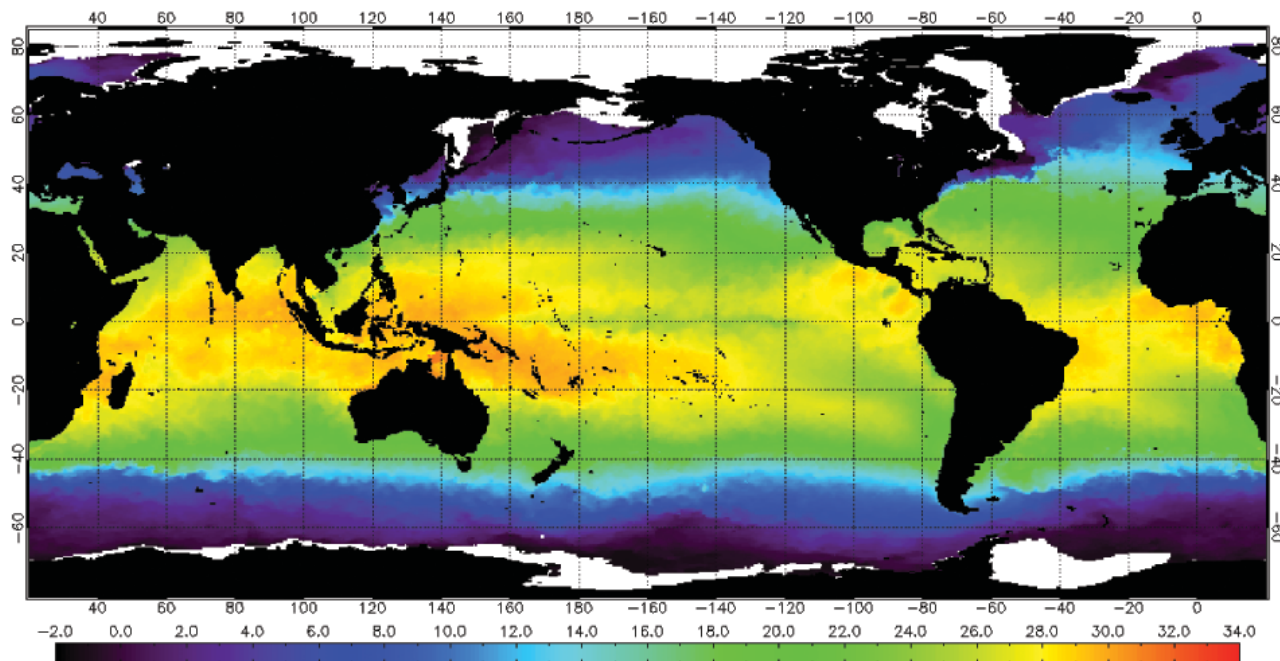
Many coral reef scientists, resource managers, and others around the world use NOAA's Coral Reef Watch (CRW) products to predict and minimize coral bleaching. NOAA's Center for Satellite Applications and Research houses all of CRW and provides operational products. In 2007, NOAA enhanced many of its CRW products to improve bleaching predictions. Coral bleaching is a response to environmental stress whereby the colored algae that live in the coral are expelled, leaving the coral looking bleached. Bleaching deteriorates the health of coral colonies. NOAA's CRW used the new global 50 km sea surface temperature climatologies to produce near-real-time coral bleaching monitoring products. In addition, NOAA used its CRW product suite to create regional near-real-time satellite coral bleaching monitoring products that provide detailed environmental information for areas along Florida's coastline. Also in 2007, NOAA's CRW released its enhanced Experimental

Doldrums product, which uses QuikSCAT satellite scatterometry-derived winds. The new product identifies regions of sustained low wind speed to help coral reef managers and scientists better assess conditions that may lead to coral bleaching. Lastly, a new website was developed as a data portal to remote sensing datasets, such as ocean surface winds and sea surface currents. The focus of this data portal is global, near-real-time data that is useful to coral reef managers and researchers around the world.

Visit [http://coralreefwatch.noaa.gov/satellite/current/experimental\\_products.html](http://coralreefwatch.noaa.gov/satellite/current/experimental_products.html) or [http://coralreefwatch.noaa.gov/crrr/data\\_resources.html](http://coralreefwatch.noaa.gov/crrr/data_resources.html) to see the new resources.

### Improving Ocean Color Products

NOAA uses ocean color data to provide important information, such as the NOAA Harmful Algal Bloom



NOAA/NESDIS 50 km Nighttime Sea Surface Temperature (degrees C).

Bulletins, useful for coastal management and decision making. To enhance this capability, NOAA’s Center for Satellite Applications and Research scientists developed a new algorithm using the shortwave infrared (SWIR) bands from NASA’s Moderate Resolution Imaging Spectroradiometer (MODIS) sensor to improve ocean color data processing in coastal regions. Data from MODIS provides open ocean chlorophyll concentrations and variability using a standard atmospheric correction algorithm for data processing. However, in coastal regions, this standard algorithm frequently produces significant errors, often the result of turbid waters. The new SWIR algorithm addresses this problem and will improve the accuracy of all products derived from ocean color data.

### NOAA Offices Support Gulf of Mexico Projects

In 2007, NOAA contributed to two Gulf of Mexico projects that were built on existing infrastructure to improve and enhance access to and dissemination of ecosystem data. First, NOAA worked with other Federal agencies and state and academic partners in the Gulf on the Subcommittee on Integrated Management of Ocean Resources, or SIMOR, Northern Gulf of Mexico Data Services Pilot. NOAA’s National Coastal Data Development Center (NCDDC) developed internet-based data access and delivery for this project. NCDDC collected and collated the datasets

provided by the participating agencies into a unique data discovery and access portal. These ecosystem datasets are indicators of the health of the Gulf of Mexico, and the portal serves as an excellent education venue for the public.

Also in 2007, NOAA helped to update the Environmental Protection Agency-NOAA Harmful Algal Blooms Observing System (HABSOS) website. NCDDC developed the HABSOS website in its entirety, including the secure Data Entry Tool and Spanish language version. Developed by U.S. and Mexican Federal and state agencies, this website is a data and information dissemination tool for the Gulf of Mexico that is now available in both English and Spanish. This website is a secure data entry tool for collecting cell count observations of the algal species *Karenia brevis*. A *Karenia brevis* bloom, commonly known as a “red tide,” can release breve toxins into the water and air that can seriously affect the health of people and marine life and disrupt local and regional economies. The challenge for coastal managers and researchers is to monitor, assess, and forecast these events and to minimize the environmental impacts. Data, such as *in situ* observations, surface forecasts, and powerful satellite imagery, are entered into the system where they are integrated and available for display via the HABSOS Internet Mapping Service.



# Predicting Climate Variability and Change

Understanding climate variability and change is critical to many aspects of our daily lives. NOAA Satellite and Information Service strives toward this goal through improving access to data for scientists, policy makers, and the public and supporting critical climate science.

## NOAA Satellite and Information Service Scientists Contribute to Nobel Peace Prize Winning Effort

On October 12, 2007, the Nobel Peace Prize was awarded to the Intergovernmental Panel on Climate Change (IPCC) and former Vice President Al Gore, “for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change.” Several NOAA Satellite and Information Service scientists and staff members contributed to this accomplishment, serving as lead and contributing authors for IPCC reports: Dr. Thomas Karl (National Climatic Data Center [NCDC]) was the IPCC Review Editor; Dr. David Easterling (NCDC), Dr. Thomas Peterson (NCDC), and Mr. Sydney Levitus (National Oceanographic Data Center [NODC]) were IPCC Report Lead Authors; and Dr. John Antonov (University Corporation for Atmospheric Research [UCAR] Visiting Scientist at NODC), Mr. Tim Boyer (NODC), Dr. Hernan Garcia (NODC), Mr. Byron

Gleason (NCDC), Dr. Pavel Groisman (UCAR Visiting Scientist at NCDC), Mr. Jay Lawrimore (NCDC), Dr. Eric Leuliette (Center for Satellite Applications and Research [STAR]), Dr. David Levinson (NCDC), Dr. Russell Vose (NCDC), and Mr. David Wuertz (NCDC) were Contributing Authors. This Nobel Peace Prize highlights how important ocean and climate research are to the global community and recognizes the key contribution made by NOAA Satellite and Information Service.

## Investigating the Influence of Ocean Salinity and Fresh Water Distribution on Climate

In 2007, NOAA’s National Oceanographic Data Center scientists studied the relationship between salinity and freshwater distribution in the North Atlantic over the past half century using both *in situ* data and an ocean circulation model. This relationship is an essential aspect of the global climate system, and variations can impact global climate change. Their find-

ings, published in three papers in 2007, showed that net precipitation, precipitation minus evaporation plus melted ice, has a strong influence on the salinity distribution in the North Atlantic Ocean. This, in turn, has a strong influence on the strength of the over-turning circulation in that ocean. As surface waters become less saline, over-turning circulation weakens (and vice versa). This over-turning circulation is a component of the *global ocean salinity conveyor belt*, the system of currents that link the different ocean basins; and increased salinity in the North Atlantic can lead to downstream changes in over-turning circulation in the North Pacific. Such circulation changes affect the amount of heat the ocean moves from one part of the globe to another, and variations in this amount can cause changes in seasonal weather patterns around the world. The results of this research are useful for verifying the accuracy of climate change prediction models and will improve our understanding of the global climate system and how to predict and respond to climate change.

## Working to Provide Drought Information

Drought events have far reaching impacts on many aspects of our daily lives, from water management to health to energy consumption and conservation.



To mitigate these impacts, on November 1, 2007, NOAA's National Climatic Data Center, working with other parts of NOAA and other Federal agencies and countries, unveiled a new, interactive website that allows the public and civic managers to monitor U.S. drought conditions, get forecasts, assess the impacts of drought on their communities, and learn about possible mitigation measures. Called the U.S. Drought Portal, the [www.drought.gov](http://www.drought.gov) site was developed as part of the National Integrated Drought Information System (NIDIS). NIDIS is a dynamic and accessible drought-risk information system that was created in response to extended drought conditions, especially in the Western United States, over the past decade. The U.S. Drought Portal will be useful to other countries around the world as nations work to coordinate drought preparedness, response, mitigation, and recovery activities.

## Reporting the State of the Climate

Periodic reporting on the state of our climate is essential to understanding the Earth's climate system and its influence on human health, safety, and welfare. To meet this need, NOAA's National Climatic Data Center led the development of the annual State of the

For more information on the State of the Climate report, visit [www.ncdc.noaa.gov/oa/climate/research/state-of-climate](http://www.ncdc.noaa.gov/oa/climate/research/state-of-climate).

Climate report, published in the June 2007 issue of the *Bulletin of the American Meteorological Society*. While observed changes in the Earth's climate have been well documented, there remains much we do not know about how future climate changes will affect societies and economies of developed and developing nations and how changes in one part of the climate system will influence other aspects of climate. Climate reports assist policy makers and resource managers in making informed decisions to respond to natural variations and changes in the frequency, intensity, and location of extreme events brought about by climate change. The annual report is a summary of global climate conditions for the year. It will be translated by the World

Meteorological Organization (WMO) into French and Spanish for wider distribution to WMO member countries.

## Argo Float Data Now Available on Google Earth™

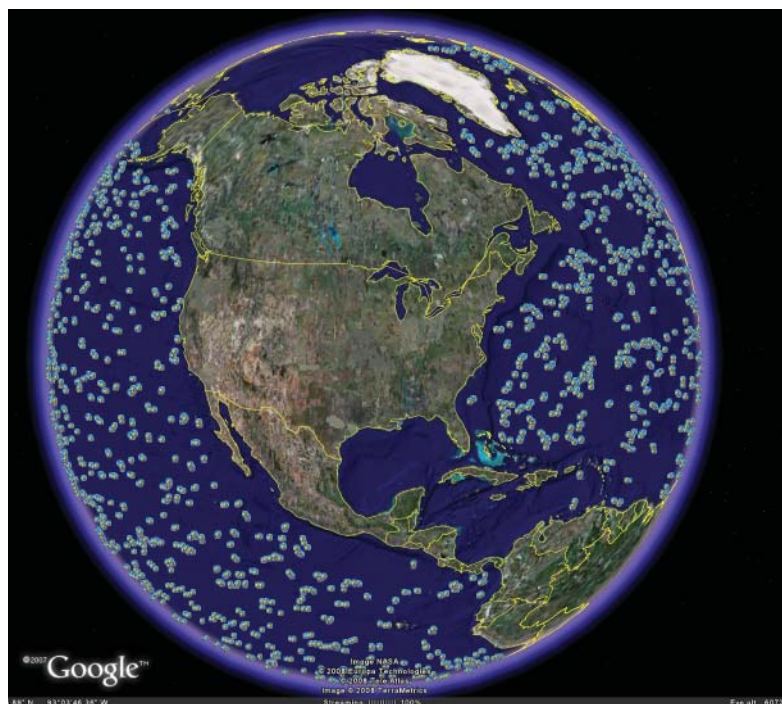
The Argo Ocean Profiling Network is a global array of 3,000 free-drifting profiling floats. These floats collect and transmit pressure, temperature, salinity, and geographic location data. As part of an ongoing partnership, NOAA's National Oceanographic Data Center has made these important Argo data available through Google Earth™, an online tool that allows users to navigate the globe to view float locations, select a specific float, and download data from that float within hours after collection. This type of information is useful for short- and long-term climate predictions and for studies of the interaction between the oceans and climate. Increasing access to Argo data will permit continuous monitoring of the state of the ocean by scientists and the public.

## Climate Data Modernization Program Rescues Data

Climate science has advanced considerably during the last two decades, yet much climate data is not readily available to government and private sector users. To make data more widely available, NOAA's National Climatic Data Center (NCDC) manages the Climate Data Modernization Program (CDMP). Through this program, NCDC rescues data by transitioning paper and microform archives into electronic form. Since it started in 1999, CDMP has placed over 52 million weather and environmental images online. In 2007,

For more information on CDMP, visit [www.ncdc.noaa.gov/oa/climate/cdmp/cdmp.html](http://www.ncdc.noaa.gov/oa/climate/cdmp/cdmp.html).

CDMP performed 58 NOAA data rescue projects that resulted in the creation of over seven terabytes of digitized climate data records available online. Access to these historic data allows decision makers to create sound plans for the future.



## Records Set for Data Access, NOAA Virtual Data System

During 2007, NOAA's National Climatic Data Center focused on implementing system upgrades to handle the rapidly increasing amount of *in situ*, radar, satellite, and model data to be handled. New software and online services include: numerous geographic information system (GIS) enhancements; a new National Solar Radiation Database; and surface data "climograms," which are color graph displays that show the frequency distributions of various parameters. The new products and services provide many benefits to decision makers and the public, such as enhanced and more efficient data discovery via GIS services, reducing the time required to determine data availability; easy online access to solar radiation data such as solar energy studies and heating and cooling loads for buildings; and comprehensive images that include over 100,000 weather observations for a location.



## Providing Weather and Water Information

In 2007, NOAA Satellite and Information Service continued to serve society's weather and water information needs by providing data for forecasting, monitoring, and preparing for weather events including hurricanes and tsunamis.

### Expanding the Digital Elevation Model Network

Digital elevation models (DEMs) are a critical foundation for tsunami forecasting and modeling efforts at the NOAA Center for Tsunami Research. To expand the DEM networks and support this NOAA-wide effort, NOAA's National Geophysical Data Center (NGDC) developed 11 high-resolution DEMs in 2007. DEMs are gridded representations of Earth's surface and are designed to improve forecasting for early tsunami

To access the DEM Discovery Portal visit [www.ngdc.noaa.gov/mgg/dem/demportal.html](http://www.ngdc.noaa.gov/mgg/dem/demportal.html).

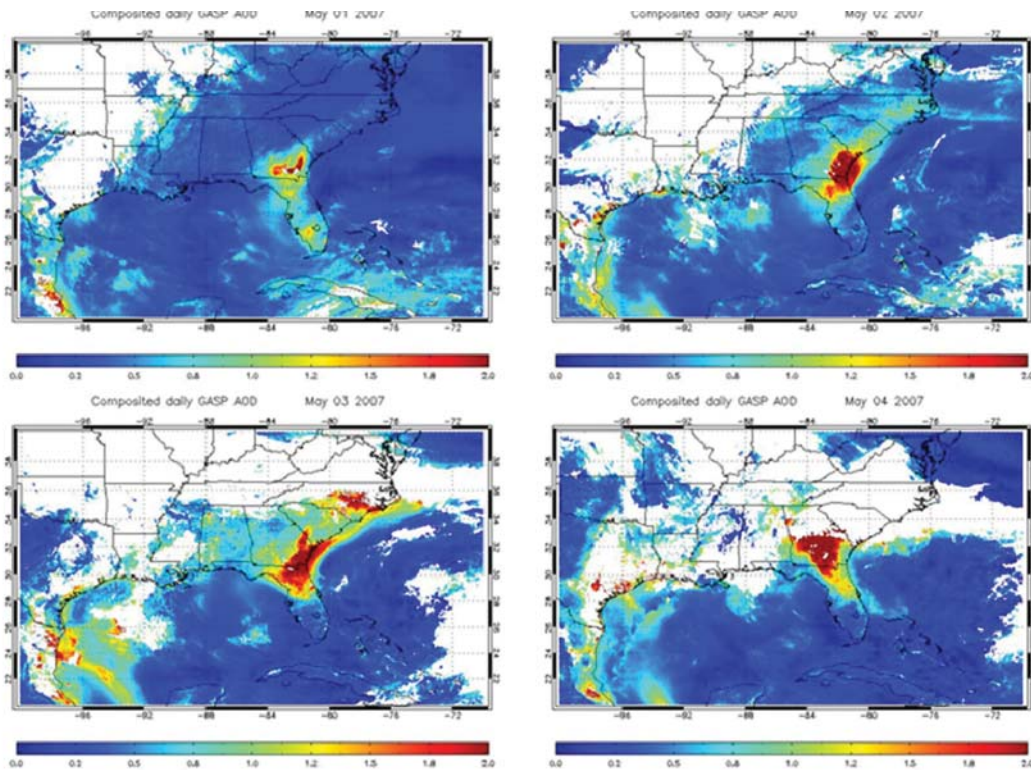
warning systems and for predicting inundation due to tsunamis, storm surge, and rainfall flooding in coastal areas. DEMs provide essential information for local and state emergency planning and response. The new DEMs are for King Cove, Alaska; Kawaihae, Hawaii; La Push, Washington; Garibaldi, Oregon; Montauk,

New York; Daytona Beach, Florida; Atlantic City, New Jersey; and Fajardo, Ponce, Arecibo, and Guayama, Puerto Rico. Also in 2007, NGDC created a web-based interactive geospatial portal for locating DEMs. The "DEM Discovery Portal" makes it easier for researchers to locate, preview, and download DEMs. The portal displays a world map showing the area of coverage for each DEM and associated images.

### Advances in Monitoring Smoke Plumes and Air Quality

In 2007, NOAA's Center for Satellite Applications and Research launched a newly developed smoke product using data from NOAA's Geostationary Operational Environmental Satellite (GOES) Imager. This enhanced capability combines aerosol measurements and hot spot detection, allowing for more detailed images. Smoke from wildfires leads to significant air pollution and deteriorates air quality. This smoke injects large amounts of aerosols into the atmosphere, which are





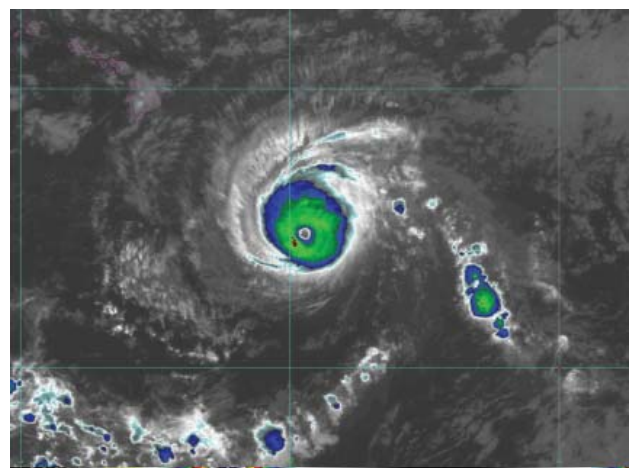
The sequence of daily composite Aerosol Optical Depth (AOD) imagery from operational GOES-12 Imager shows a wildfire event in Georgia. The event began in late April and lasted into mid May 2007, resulting in widespread haze from smoke (areas in map with bright red color).

detrimental to human health and the economy. For example, smoke plumes can cause upper respiratory problems that can result in increased emergency hospital visits and higher healthcare costs. Satellite instruments, such as NOAA’s GOES Imager, detect and track the movement of these smoke plumes. NOAA’s National Weather Service uses this new GOES smoke product in its smoke forecast verification system. Air quality forecasters use GOES aerosol imagery and other air quality forecasting tools to warn the public of elevated smoke concentrations so preventive measures can be taken.

### Annular Hurricane Index Becomes Operational

Annular hurricanes, a special subset of hurricanes, present a significant challenge to forecasters because they have highly circularly-symmetric structures, large eyes, and few to no outer rain bands. Annular hurricanes tend to be significantly stronger, maintain their peak intensities longer, and weaken more slowly than average hurricanes. These characteristics result in forecasts that underestimate storm intensity,

which can be particularly dangerous if the hurricane threatens land. To try to improve annular hurricane forecasts, scientists from NOAA Satellite and Information Service and the Cooperative Institute for Research in the Atmosphere at Colorado State University developed the Annular Hurricane Index (AHI). This index provides real-time objective iden-



A color-enhanced infrared satellite image of Hurricane Flossie on August 13, 2007. Blue, green, and red colors indicate the coldest cloud tops associated with the strong thunderstorms near the storm center. At the time of this image, Hurricane Flossie was an annular hurricane, with a large symmetric eye and very few outer rain bands.

tification of annular hurricanes. AHI uses geostationary infrared satellite imagery and environmental fields from global forecast model analyses to determine the degree of annular structure in a hurricane. This index was implemented operationally at NOAA's National Hurricane Center in Miami for the 2007 hurricane season. It performed well and correctly identified eastern Pacific Hurricane Flossie as an annular hurricane as it approached the island of Hawaii on August 13, 2007. With the success of AHI, forecasters now have a valuable new tool for improving intensity forecasts for these rare, but strong, storms.

### Predicting Tropical Rainfall Potential

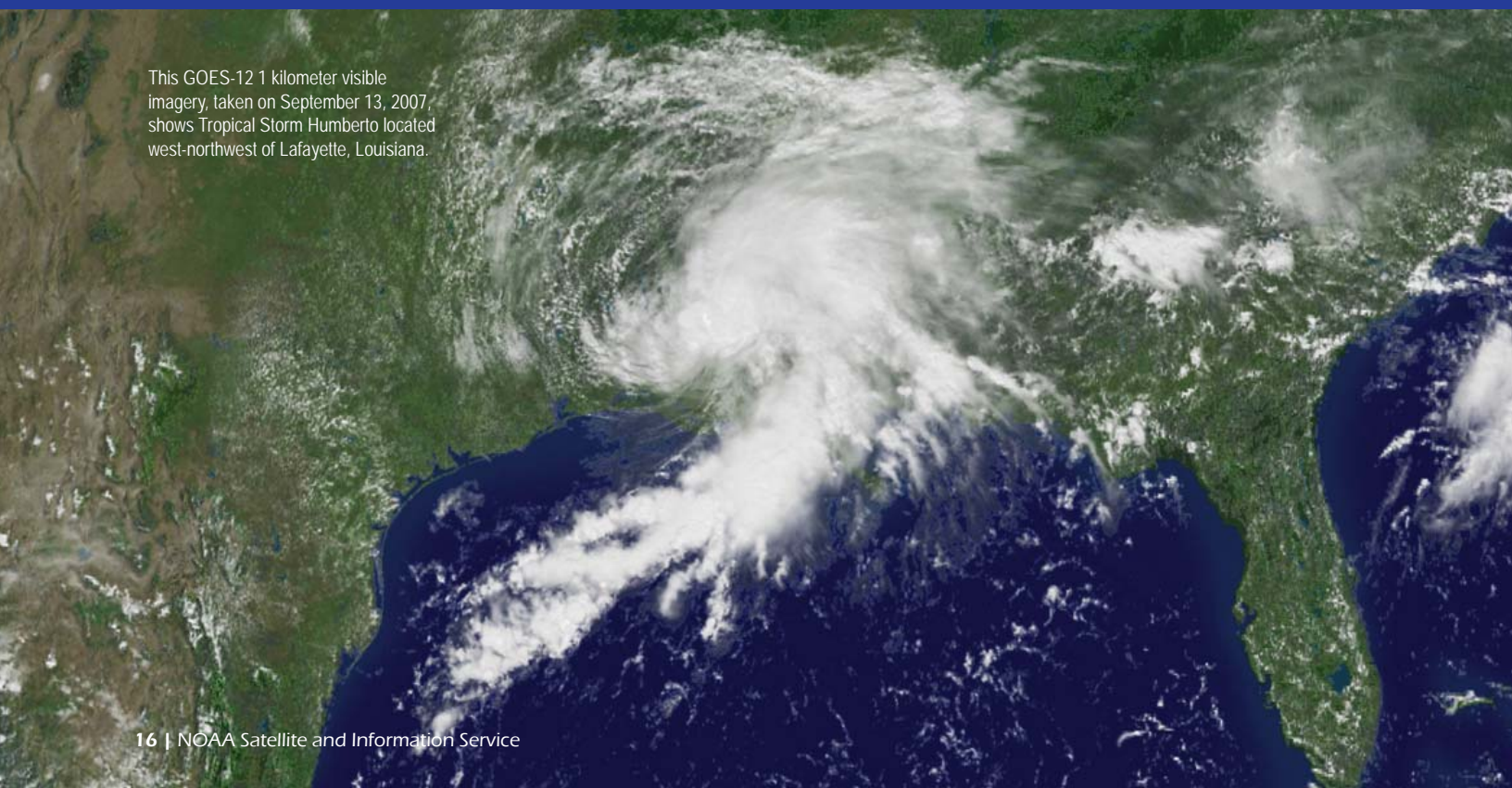
Satellite based analysis of heavy rainfall potential from tropical systems is integral to determining the magnitude and extent of flooding from these systems. The Tropical Rainfall Potential (TRaP) product, which was completely automated in 2007 by NOAA's Office of Satellite Data Processing and Distribution, is an objective analysis of the amount of rainfall associated with tropical systems. This product has provided significantly more information to customers around the globe and has increased the availability of rainfall potential guidance using a greater number of microwave instruments. In addition, the TRaP customer portal was redesigned to simplify and increase the efficiency

of information searches and display capabilities for users.

### Cooperating with the French Space Agency on Argos

Since 1978, NOAA and the French Space Agency (CNES) have administered the Argos program, which provides global data collection services of environmental data. The Argos system has been used to collect data from ocean profiling floats and fixed ocean buoy arrays and to track wildlife migrations. There are over 17,000 active Argos platforms. In 2007, in response to customers' needs and a nearly 15 percent growth rate in Argos data platforms, NOAA and CNES increased bandwidth and communications to significantly improve Argos system capabilities. This greatly increased the system's effectiveness and efficiency for all users. NOAA and CNES also developed a plan to manage user costs over the next seven years and to jointly contribute resources to the new mission, provided by the India Space Research Organization. By 2015, users will realize the benefits of these cost savings, projected at \$1.5 million, and NOAA anticipates this new mission will become a key component of the multilateral Global Earth Observation System of Systems.

This GOES-12 1 kilometer visible imagery, taken on September 13, 2007, shows Tropical Storm Humberto located west-northwest of Lafayette, Louisiana.





## Supporting Commerce and Transportation

Several NOAA Satellite and Information Service programs help to ensure that individual and commercial transportation is safe, efficient, and environmentally sound.

### The COSPAS-SARSAT System

NOAA's polar-orbiting and geostationary satellites, along with Russia's COSPAS spacecraft, are part of the high-tech, international Search and Rescue Satellite-Aided Tracking System, called COSPAS-SARSAT. In 2007, 353 people were rescued in the United States because of this system. For example, four people in Lake Michigan were saved when a powerful storm knocked out communications on their boat, which was running low on fuel, and four people and a dog were pulled to safety from their sinking boat near Kanatak, Alaska. After 25 years of operation, the COSPAS-SARSAT system has contributed to saving over 22,000 lives worldwide because it quickly detects and locates distress signals from emergency beacons on ships, aircraft, and handheld devices. The NOAA SARSAT Team operates from the new, state-of-the-art NOAA Satellite Operations Facility, processing signals and alerting the appropriate search and rescue authorities.

### Improving the Accuracy of Magnetic Navigation

Magnetic variations in the rock of the Earth's crust can cause significant issues for navigation. To address these problems, in 2007 NOAA's National Geophysical Data Center, supported by the National Geospatial-Intelligence Agency, developed a high-resolution model of the Earth's crustal magnetic field that has significantly improved the accuracy of navigation. This model, which was built using satellite, marine, aeromagnetic, and ground magnetic surveys worldwide, reduces directional errors caused by the crustal magnetic field. The Earth's main magnetic field is used by navigation systems in cars, small boats, and aircraft. In addition, NOAA uses magnetic field information for nautical and aeronautical charting and to orient satellites after launch. This new model significantly improves compass and Global Positioning System navigation. More accurate navigation benefits both the civilian and military sectors.

## Providing Historic Magnetic Declination Information

As the Earth's magnetic field changes, the magnetic coordinates of a particular spot on the Earth's surface, called the magnetic declination, change as well. In 2007, NOAA's National Geophysical Data Center introduced the new online U.S. Historic Declination Calculator. This tool provides fast and easy access to

The U.S. Historic Declination Calculator is available at [www.ngdc.noaa.gov/seg/geomag](http://www.ngdc.noaa.gov/seg/geomag).

magnetic declination going back to 1750. This calculator allows users to search by zip code and dates of interest. It is popular among land surveyors, pilots of small aircraft and boats, and researchers. If, for example, a surveyor is trying to find a specific property boundary using a map from the 1900s, he or she can use historic magnetic declination information from this calculator to correct for changes in magnetic declination over time at the location.

## Partnering with Southeast Asia to Monitor Wildfires

In the United States, scientists use the Hazard Mapping System (HMS) to detect, identify, and analyze large wildfires and smaller-scale burning events. In 2007, NOAA Satellite and Information Service scientists worked closely with scientists from the King Mongkut Institute in Bangkok, Thailand, to develop and adapt HMS and provide HMS training so they could analyze fires and smoke over Thailand and surrounding territories. HMS information is useful for creating smoke trajectory models that monitor regions of decreased air quality, ensuring safe and efficient air and maritime travel and commerce. NOAA Satellite and Information Service and the Institute are establishing a Southeast Asian Satellite-based Fire Mitigation Center, which will detect and mitigate wildfires and smoke episodes over Southeast Asia. These initiatives are a continuation of NOAA Satellite and Information Service's support for international partnerships and the Global Earth Observation System of Systems.

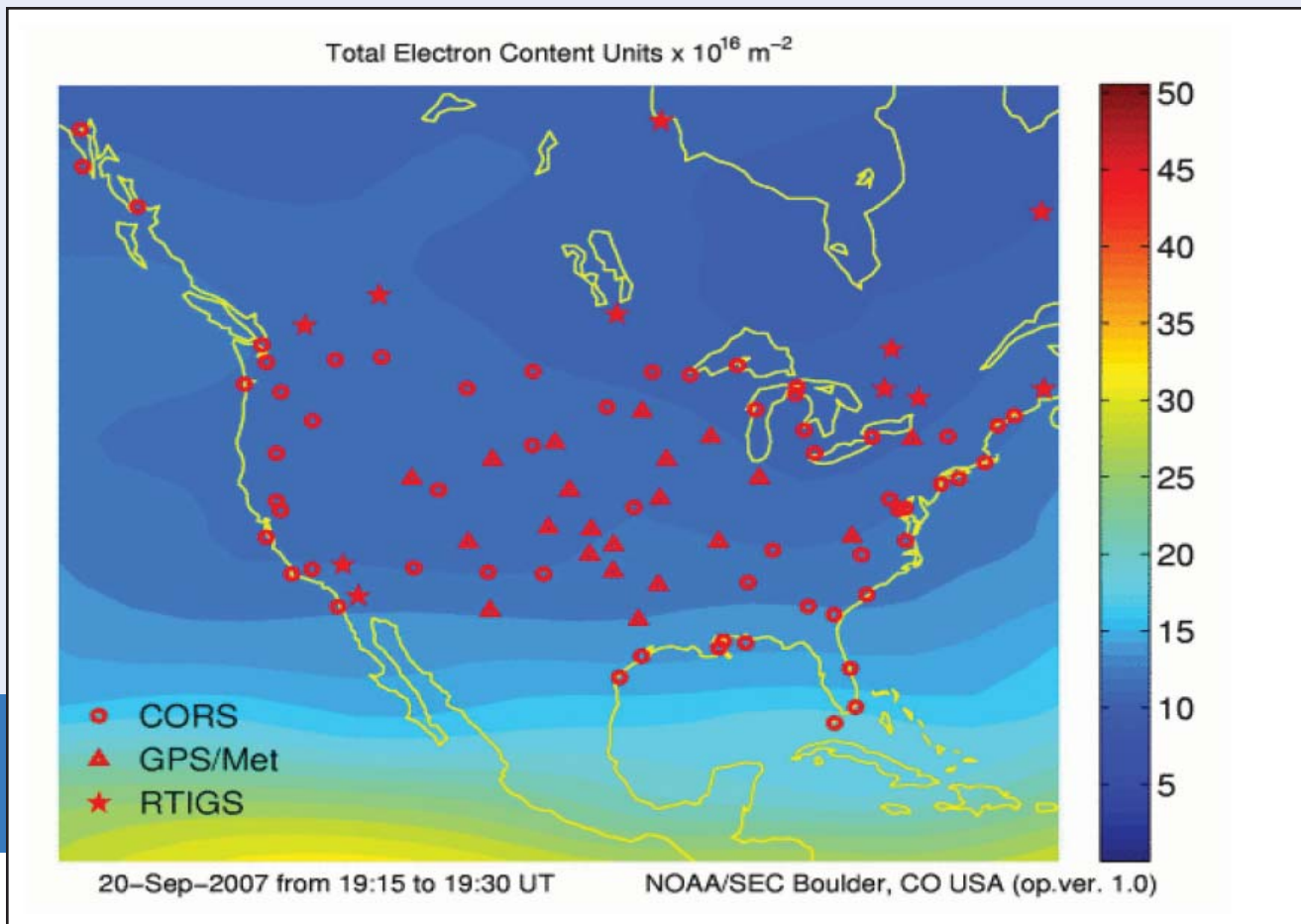
## Improving GPS Accuracy

Active electrons in the atmosphere cause issues for the Global Positioning System (GPS) by delaying signals traveling toward Earth. To address this problem and to increase GPS accuracy, NOAA's National Geophysical Data Center launched the U.S. Total Electron Content (US-TEC) product in June 2007. This product, which took several years to develop, provides measurements of the ionosphere's TEC. US-TEC provides measurements of the delay magnitude for different GPS satellites at different times of day. US-TEC products and information allow GPS users to obtain more accurate positions with their standard GPS receivers. The US-TEC product contains GPS data from the Continually Operating Reference Stations, the International GPS Services, and GPS/Met networks to estimate vertical and slant TEC every 15 minutes.

Real-time US-TEC output is available at [www.sec.noaa.gov/ustec](http://www.sec.noaa.gov/ustec), and historical data can be found at [www.ngdc.noaa.gov/stp/IONO/USTEC](http://www.ngdc.noaa.gov/stp/IONO/USTEC).

## Office of Space Commercialization Continues to Foster Economic Growth

NOAA's Office of Space Commercialization (OSC) conducts space commerce policy activities within NOAA. Its mission is to promote the economic growth and technological advancement of the U.S. commercial space industry. To further define its mission, goals, and objectives, OSC released its Strategic Plan in April 2007. Under this plan, OSC will assist commercial space companies in their efforts to do business with the U.S. government, seek to remove institutional impediments to space commerce, and increase awareness of opportunities to promote private sector investment in U.S. space commerce. In recognition of OSC's importance, the White House submitted proposed legislation titled "Space Commerce Act of 2007" in October 2007 to clarify and update the roles and responsibilities of the Office.



Contours of Total Electron Content and location of observing stations.

## Working to Promote the U.S. Global Positioning System

One of NOAA's Office of Space Commercialization's (OSC's) major responsibilities is to promote growth in the U.S. commercial space industry. As host of the National Coordination Office for Space-Based Positioning, Navigation, and Timing (PNT), OSC continued to manage GPS.gov and PNT.gov. GPS.gov illustrates the broad variety of Global Positioning System (GPS) applications. During 2007, OSC worked with the State Department to expand the audience for

this site by translating it into four languages (Spanish, French, Chinese, and Arabic). PNT.gov disseminates public information about GPS/PNT policy matters. In 2007, OSC more than doubled the amount of content posted to PNT.gov, attracting some 120,000 visits between January and September 2007. Finally, OSC opened the "GPS Adventures" exhibit in June 2007 at the Minnetrista Cultural Center in Muncie, Indiana, to a crowd of GPS enthusiasts that broke the museum's record for opening day attendance.



## NESDIS Community

While working to further the NOAA mission by supporting and enhancing existing programs and developing new technologies, NOAA Satellite and Information Service also looks for opportunities to strengthen our community.

### Supporting the NOAA Graduate Sciences Program

The NOAA Graduate Sciences Program (GSP) is designed to offer full-time students with Bachelor's or Master's degrees in mathematics, science, economics, and engineering entry-level employment and educational training and research experience in atmospheric, environmental, and oceanic sciences and remote sensing technology. This program is also targeted toward women and minorities. Students are mentored by NOAA scientists while conducting research. NOAA's Educational Partnership Program is pleased to announce two GSP participants, Dr. Marco Vargas and Ahira M. Sánchez-Lugo, joined the NOAA Satellite and Information Service full time in 2007.

Marco Vargas completed his Doctorate Degree in Electrical Engineering, specializing in remote sensing, in January 2007. A full-time employee at NOAA Satellite and Information Service's Center for Satellite and Applications Research, Dr. Vargas's dissertation, titled "Improved Retrieval of Water Leaving



Members of the NOAA Graduate Sciences Program: Dr. Marco Vargas, show left, and Ahira M. Sánchez-Lugo, right.

Reflectance and Chlorophyll in Coastal Productive Waters,” is an effort to improve coastal remote sensing. His results are in press in *Applied Optics*. Dr. Vargas’s fascination with remote sensing was spurred by the images of the Earth taken by astronauts during space missions. In his post at NOAA Satellite and Information Service, he is studying the phenology of phytoplankton using satellite ocean color observations. He is also working on validating a new algorithm to calculate snow water equivalent, the amount of liquid water contained in a volume of solid snow, from satellite microwave measurements.

Ahira M. Sánchez-Lugo completed her Masters Degree in Meteorology in March 2007. Ms. Sánchez-Lugo is a full-time employee at NOAA’s National Climatic Data Center (NCDC). Her thesis, titled “An Index to Measure the Influences of Climate on Residential Natural Gas Demand,” investigated the relationship between daily temperature fluctuations and residential natural gas usage. Her research focused on the winter months when residential demand is dominated by heating. At NCDC, Ms. Sánchez-Lugo is working on State of the Climate reporting and developing climate Indices. She also assists in the development and maintenance of NCDC Climate Monitoring Branch databases and products and interacts with media representatives and the public.

## NOAA Satellite and Information Service Recognized for Gulf of Mexico Educational Sheet

In 2007, NOAA’s National Coastal Data Development Center won second place in the Youth/Education category for designing and publishing the NOAA Extreme Weather Information Sheet (NEWIS) in a contest sponsored by the Gulf of Mexico Program Partnership. The Gulf of Mexico Program Partnership developed the Gulf Guardian Awards to recognize and honor businesses, people, and agencies taking positive steps to keep the Gulf healthy, beautiful, and productive. NEWIS provides critical emergency information tailored for the coastal parishes and counties in Mississippi, Alabama, Louisiana, Texas, and Florida. NEWIS is menu-style, double-sided, color, laminated, and water-proofed. The sheet contains emergency and general contact information for NOAA Weather, Coastal, and Marine services, as well as related information for other Federal, state, and local agencies and nongovernment organizations, including information on first responders. NEWIS was delivered to a variety of locations within each county/parish. In 2007, NOAA Satellite and Information Service produced 130,000 NEWIS for distribution in the five states.



## 2007 Administrator's Awards

### NESDIS Nominations

#### Larry W. Carr, NCDC

For improving logistical, property, supply, and procurement support for the National Climatic Data Center and NOAA, including managing personal property accounts valued in excess of \$4 million, located in six separate states.

#### Paul S. Chang, STAR

For leading the development of the first global ocean wind vector retrievals from the first passive polarimetric satellite microwave sensor, enabling operational observations.

#### Paul E. Pegnato, CFO/CAO, MOAO

For technical expertise and leadership as NOAA Project Manager for the construction and outfitting of the NOAA Satellite Operations Facility.

#### Anna Fiolek, NODC

For compiling "International Polar Year 2007-2008: Resources on Polar Research in the NOAA Central Library Network: A Selected Bibliography," a comprehensive resource containing over 1,400 citations.

#### David H. Levinson, NCDC

#### Michael F. Squires, NCDC

For conducting a research study that established new meteorological criteria used in setting engineering standards for the rebuilding of hurricane and flood protection infrastructure for southern Louisiana.

#### Denise R. Sylvester, NGDC

#### LCDR Gregg Glover, NMAO

#### Carla J. Moore, NGDC

#### Ted Habermann, NGDC

For designing and deploying a standards-based data tracking system that provides the National Geophysical Data Center with a centralized management tool for recording processing lineage.

### Nominations submitted by other offices

#### Matthew J. Menne, NCDC

#### Claude N. Williams, Jr., NCDC

This is a National Weather Service group nomination. For conceiving the original idea, developing the scientific process, designing and testing the product, and implementing the Local 3-Month Temperature Outlook: NOAA's 'first' local climate forecast product designed to meet a wide range of customer needs.

#### Timothy W. Owen, NCDC

This is a National Weather Service group nomination. For creating new climate information products and services in response to increasing customer requests so that local and national decision makers can make economically, socially, and environmentally sound choices.

## 2007 NOAA Gold Medals

### NESDIS Nominations

#### Paul S. Chang, STAR

#### Eugene D. Legg, OSDPD

#### Hugh D. Cobb III, NWS

#### Roger T. Edson, NWS

#### James L. Franklin, NWS

#### Richard D. Knabb, NWS

#### Kevin Schrab, NWS

#### Joseph M. Sienkiewicz, NWS

For leading NOAA's operational use of NASA's QuikSCAT satellite to produce more accurate forecasts and warnings of marine and coastal weather.

#### Christopher W. Brown, STAR

#### Kent H. Hughes, STAR

#### Eugene D. Legg, OSDPD

#### Linda Stathoplos, OSDPD

#### Mary E. Culver, NOS

#### Richard Paul Stumpf, NOS

For creating NOAA's first operational satellite ocean biology product system to improve NOAA's ocean and coastal forecasts and warnings.

### Gold Nominations submitted by other offices

#### Thomas R. Karl, NCDC

#### Thomas C. Peterson, NCDC

#### Russell S. Vose, NCDC

#### Richard William Reynolds, NCDC

This is an Office of Oceanic and Atmospheric Research group nomination. For improving the understanding of observed climate change and causes by showing that global average atmospheric warming is similar to surface warming.

## 2007 NOAA Silver Medals

### NESDIS Nominations

#### Christopher D. Elvidge, NGDC

For developing a technique to estimate current and historic rates of natural gas flaring through an effective use of satellite imagery data.

#### Cheng-Zhi Zou, STAR

For developing a calibration technique breakthrough enabling detection of reliable long-term atmospheric temperature trends from satellite data.

#### W. Paul Menzel, retired - formerly with STAR

#### Eileen M. Maturi, STAR

#### Donald G. Gray, OSD

#### Xiangqian Wu, STAR

#### Richard William Reynolds, NCDC

#### Kent H. Hughes, STAR

#### John Frederick Sapper, OSDPD

#### Jeffrey J. Polovina, NMFS

#### Gary Lee Hufford, NWS

For using geostationary satellite data to create hourly sea surface temperatures that have expanded understanding of ecosystems, weather, and climate.

## 2007 NOAA Bronze Medals

### NESDIS Nominations

#### Ken Knapp, NCDC

For analyzing terabytes of data from 18 different satellites from more than 20 years of observations in order to create climate data records on hurricane trends and improve the understanding of climate variability and change.



Mark DeMaria, STAR  
Antonio Irving, OSDPD  
Nancy Merckle, OSDPD  
John A. Knaff, STAR

For the development and operational implementation of the Tropical Cyclone Formation product that quantitatively predicts storm formation probability.

Janice A. Beattie, NODC  
Dorothy Anderson, OCIO  
Anna Fiolek, NODC  
John McDonough, OAR  
Betsy Schenck-Gardner, NODC  
Donald W. Collins, NODC  
Steven Rutz, NODC  
Sharon M. Mesick, NODC  
George F. Sharman, NGDC  
Eric Roby, NODC  
Julie A. Bosch, NODC

For developing a unique, end-to-end data management system to organize, archive, and disseminate ocean exploration information for researchers and the public.

Thomas Schott, OSD  
David A. Benner, OSDPD  
Antonio Irving, OSDPD  
Selina M. Nauman, OSDPD  
Brian Hughes, OSDPD  
Eileen Maturi, STAR  
Hank Drahos, STAR

For developing and implementing processes to shorten the transition of satellite products from research to operations to meet critical user needs.

Timothy W. Owen, NCDC  
Nathaniel Guttman, NCDC  
Karsten Shein, NCDC  
Robert E. Livezey, NWS  
Robert J. Leffler, NWS  
Michael J. Brewer, NWS  
Myron Berger, NWS  
Douglas Kluck, NWS  
Timothy Kearns, NWS  
Andrea Bair, NWS

For greatly improving climate data services and data management through enhanced collaboration between NOAA and its climate service partners.

Office of Satellite Operations (OSO)  
Office of Satellite Data Processing and Distribution (OSDPD)  
Office of Systems Development (OSD)

For coordinating the logistics and movement of more than 500 people, as well as highly sensitive operational equipment, to a new facility—the NOAA Satellite Operations Facility—without interrupting the 24/7 operations of 16 on-orbit satellites.

[Bronze Nominations submitted by other offices](#)

Stephen DelGreco, NCDC  
Timothy W. Owen, NCDC

This is a National Weather Service group nomination. For developing a paperless system for the collection of COOP data that allows for real-time data integration, quality control, and dissemination.

Paul S. Chang, STAR

This is an Office of Oceanic and Atmospheric Research group nomination. For employing a unique technology to diagnose Hurricane Katrina's winds, a technology needed for surge, wave, intensity, and ecosystem modeling efforts.

Antoinette D. Parham, NESDIS AA Office

This is an Office of the Chief Administrative Officer group nomination. For leading a business process reengineering effort, involving over 1,300 stakeholders, to strengthen NOAA's budget, workforce management, and grants functional areas.

## 2007 NESDIS Distinguished Career Award Recipients

Janet Wall, NCDC

For providing access for the public to the nation's climatological data through a long-term commitment to exemplary customer service.

Janice A. Beattie, NODC

For leadership, enthusiasm, and vision in developing the NOAA Central Library and providing information services which support NOAA's national and international missions.

Dan Tarpley, retired - formerly with STAR

For pioneering research in Earth surface satellite measurements resulting in new applications and increased users for NOAA's satellite observations.

## Other Awards

[NOAA Team Member of the Month for April 2007](#)

Dr. Tim Mavor, STAR

For successfully developing and implementing the Geostationary Operational Environmental Satellites (GOES) sea surface temperature daily frontal product.

[NOAA Employee of the Month for July 2007](#)

Menghua Wang, STAR

For developing an innovative approach to NASA's Moderate Resolution Imaging Spectroradiometer sensor resulting in significantly improved atmospheric correction and more accurate ocean color data products.

[NOAA Team Member of the Month for November 2007](#)

Dr. Lidia Cucurull, NESDIS/NWS

Led the effort at the Joint Center for Satellite Data Assimilation in conducting testing and exploitation of Constellation Observing System for Meteorology, Ionosphere, and Climate (COSMIC) data in the Global Forecast System following its launch in April 2006.



**Thank you for the achievement!**





[www.noaa.gov](http://www.noaa.gov)  
U.S. Department of Commerce  
National Oceanic and Atmospheric Administration