

2006 ACCOMPLISHMENTS REPORT



To be the world's premiere source of comprehensive environmental data and information



NOAA Satellite & Information Service





NOAA SATELLITE AND INFORMATION SERVICE

NOAA'S VISION

An informed society that uses a comprehensive understanding of the role of the oceans, coasts, and atmosphere in the global ecosystem to make the best social and economic decisions.

NOAA'S MISSION

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.

From The Assistant Administrator

Dear Colleagues and Friends of NOAA's Satellite and Information Service:

2006 has been an exciting year as NOAA's Satellite and Information Service (NESDIS) continued to be an international leader in changing the way integrated environmental observations and information are captured, managed, stored, shared, and used to benefit the world. We are pleased that we have been an integral part in supporting NOAA's mission and vision this year, and we look forward to continuing this journey in 2007.

NESDIS experienced both accomplishments and challenges in 2006. We successfully launched and completed checkout testing of our newest geostationary satellite, called GOES-13; this satellite will help ensure continuity of geostationary satellite data, which is critical to severe weather and tropical storm forecasting and monitoring. We started moving into our new world-class satellite operations facility while still maintaining continuous operation of all our satellites. We improved the products we provide to the public and access to archived information. For example, we now offer improved access to key National Weather Service datasets, provide one-stop data shopping for environmental information for the Gulf Coast region, and continue to provide Digital Elevation Models for coastal regions to support the accuracy of tsunami inundation modeling projects. In addition, we are continually working with the user community and the public to improve the products we develop and provide. This year we also worked closely with our international partners, moving one of our geostationary satellites to enable improved monitoring and forecasting in South and Central America.

NOAA continues to move ahead with two major future satellite acquisition programs: the Geostationary Operational Environmental Satellite Series-R (GOES-R) program and the National Polar-orbiting Operational Environmental Satellite System (NPOESS), a joint endeavor with our partners at the Department of Defense and NASA. Both programs are challenging, and we are dedicated to maintaining continuity of data between our current satellite programs and these future programs. In addition, we must continue to look at data archives and access systems needed to improve the utility of data we preserve for the public.

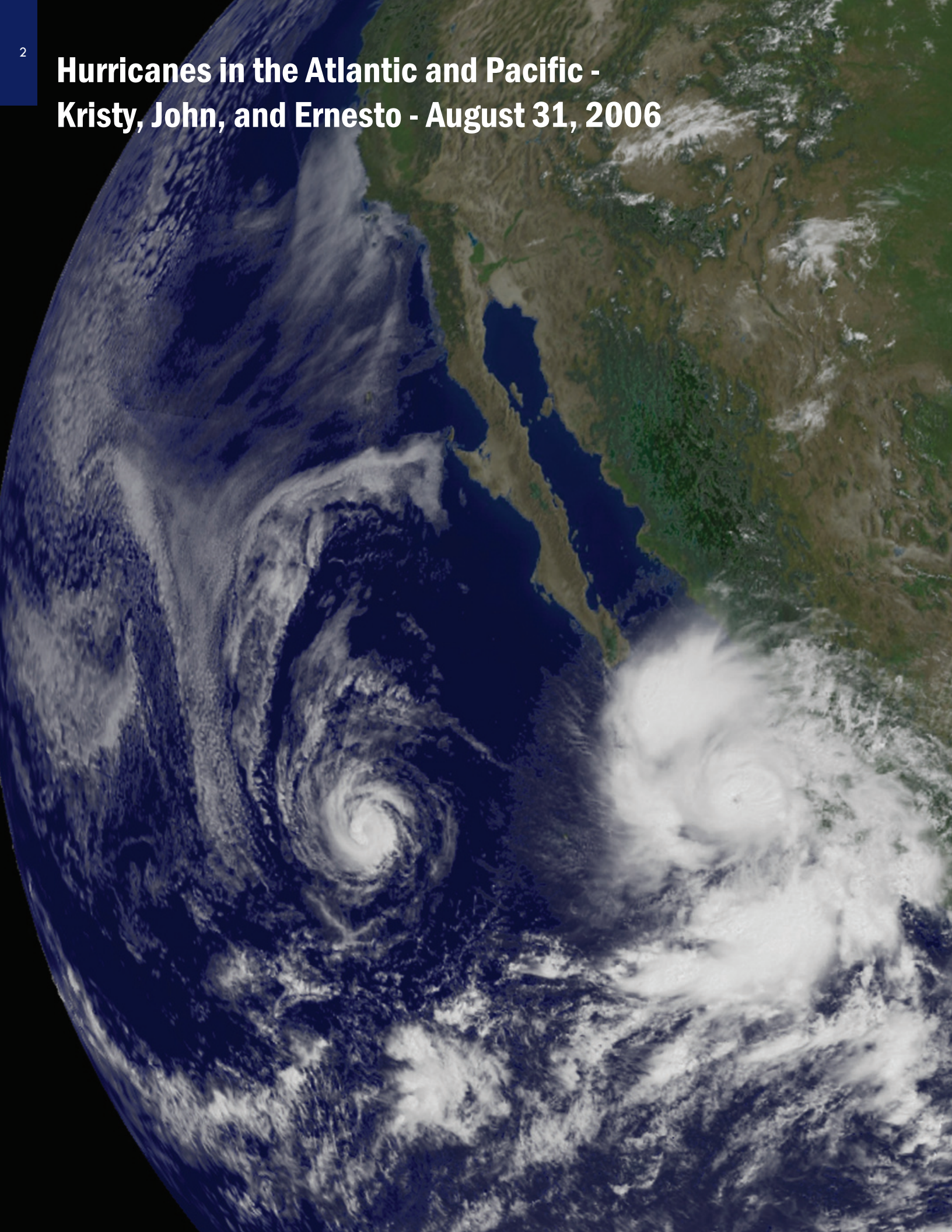
I have been at NOAA for a year now, and I am continually impressed with the quality and dedication of the NOAA employees. I hope you enjoy reading about our accomplishments as they demonstrate the dedication of the hard-working NESDIS team. I look forward to working with our team and our national and international partners as we continue to improve in 2007.

Mary E. Kicza

Assistant Administrator for Satellite and Information Services



Hurricanes in the Atlantic and Pacific - Kristy, John, and Ernesto - August 31, 2006





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. NESDIS supports this mission through its current and future satellite programs and data management endeavors.

solar storm activity, which can adversely affect power grids, communication systems, and space travelers; relay distress signals from emergency beacons; provide ocean surface temperature data to fishermen and climatologists; and scan the landscape for the latest drought and flood conditions, improving the Nation's ability to forecast weather and monitor environmental conditions. GOES-13 is in on-orbit storage and is ready to replace one of the two operational geostationary satellites (GOES-11 and GOES-12) when necessary.

Current Spacecraft GOES-13 Launched

A new NOAA Geostationary Operational Environmental Satellite (GOES), GOES-13, was successfully launched from Cape Canaveral Air Force Station, Florida, on May 24, 2006. This satellite will supply data critical for fast, accurate forecasts and warnings for severe weather, including tornadoes, winter storms, and hurricanes. In addition, it will detect solar

Launch of MetOp-A Marks Major Milestone in U.S.-European Cooperation

A major milestone in the U.S.-European Initial Joint Polar System (IJPS), a joint NOAA and European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) system, was reached in October 2006 with the launch of MetOp-A, the first European polar-orbiting meteorological satellite. MetOp-A is the first in a series of three satellites that will provide operational meteorological data until 2020. A key component of the partnership involves the MetOp series carrying important NOAA instruments, and NOAA flying a European instrument on its polar-orbiting satellites.

NOAA Supports Launch and Operation of New Military Weather Satellite

A new satellite for the Defense Meteorological Satellite Program (DMSP-17) was launched from California's Vandenberg Air Force Base on November 4, 2006. Due to similarities to NOAA's Polar-orbiting Operational Environmental Satellites (POES), NOAA is able to provide satellite commanding and data processing support to the Air Force DMSP program, reducing the overall cost to U.S. taxpayers. Information from these satellites is used in planning and conducting U.S. military operations worldwide.

Future Spacecraft

National Polar-orbiting Operational Environmental Satellite System Program Restructured

In June 2006, the Tri-Agency (Department of Commerce, Department of Defense, and NASA) National Polar-orbiting Operational Environmental Satellite System (NPOESS) program completed a congressionally mandated Nunn-McCurdy certification, a process to examine and limit the cost growth of a project. During this process, all aspects of the program were examined, and a new path forward was created. Through this restructured NPOESS program, continuity of satellite data will be maintained to benefit the civilian, scientific, and military communities, saving lives and money by improving weather prediction, forecasting and modeling, search and rescue efforts, peacekeeping activities, and disaster relief. NPOESS is currently in the development phase. Instruments are being built and tested, and teams of scientists are addressing technical issues encountered during this highly challenging stage in the program.

Geostationary Satellites Advance: Series R Moves Forward

In 2014, NOAA will launch the third generation of its geostationary satellites: GOES-R. GOES-R will provide new and improved atmospheric, oceanic, climatic, solar, and space data. This new satellite series will scan the Earth nearly five times faster than the current GOES, providing television meteorologists, private weather companies, the aviation and agriculture communities, and national and international government agencies with about one hundred times the amount of data currently provided. GOES-R is currently in the acquisition phase, and independent teams of respected industry and government scientists are examining all aspects of the program to ensure that GOES-R meets its goals.

Data Management

Enhanced Online Data Management System

The Comprehensive Large Array-data Stewardship System (CLASS), an online data management system, gives users faster and easier access to environmental data collected and maintained by NOAA. During 2006, the CLASS project team worked on a pilot project that will demonstrate long term secure storage of data. CLASS will enhance the safety and security of NOAA's archives and enable those archives to be available to the public for many years. In addition, it is expected that CLASS will improve data discovery and delivery mechanisms for public use by streamlining the access strategy and supporting additional satellite data streams, environmental sensor data, data from buoys, plus geophysical and solar environmental data.

Moving to NOAA's New World Class Satellite Operations Facility

During 2006, many NESDIS programs, including GOES and

POES mission systems, moved to the new NOAA Satellite Operations Facility (NSOF), while continuously operating 24/7. NSOF allows greater integration of NOAA's satellite operations and supporting programs by collocating them in a state of the art facility. This facility houses five mission critical systems and a satellite operations center that operates around the clock, 365 days a year. NSOF also contains the U.S. Mission Control Center for the Search and Rescue Satellite-aided Tracking (SARSAT) program and the National Ice Center (NIC). Critical communications infrastructure and antenna systems are installed at NSOF, and all programs are expected to be working out of the new facility in early 2007.

Global Earth Observation System of Systems

Geostationary Satellite Moved to Further Global Observation System

As part of the United States contribution to the international Global Earth Observation System of Systems (GEOSS), NOAA repositioned a geostationary satellite, GOES-10, over South America to provide better meteorological coverage for the region. In addition to increasing NOAA's ability to track eastern Atlantic hurricanes, the move helps South American meteorological centers improve weather forecasting and demonstrates the goals of the intergovernmental Group on Earth Observations (GEO). Shifting GOES-10 will also help protect lives and property in North, Central, and South America by significantly improving satellite detection of such natural hazards as severe storms, floods, drought, landslides, volcanic ash clouds, and wildfires.

Progress Achieved on GEONETCast Initiative

GEONETCast is a cooperative effort among many nations and organizations that will improve world-wide access to information about the Earth and its environment. The objective of this global network is to link GEOSS data providers with users while minimizing costs and the technology required to access the information. With a 24/7 data stream, GEONETCast will provide information critical to efforts such as disaster mitigation and agriculture management. In 2006, GEONETCast demonstrated technical capability at more than seven venues, including the 3rd GEO Plenary meeting in November.





Managing Our Ecosystems

During 2006, NESDIS 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.

Supporting the Gulf Coast Region

Using Ocean Science and Technology in the Gulf

As part of the Subcommittee on Integrated Management of Ocean Resources (SIMOR), NESDIS teamed with the Southeast Fisheries Science Center and other Federal, state, and academic agencies to facilitate the use of ocean science and technology in the

northern Gulf of Mexico. This ecosystem data service integrates and tailors data so state coastal and marine resource managers and the public can access a complete source of information that includes resources and habitat characteristics. For example, using interactive mapping, commercial fishermen can locate critical habitat for protected species as well as find regulatory boundaries for species harvesting in the Gulf of Mexico.

Dead Zone Maps Published for the Gulf of Mexico

From June 9 through mid-July, scientists from NOAA's National Coastal Data Development Center (NCDDC) and the NOAA National Marine Fisheries Service posted maps

online showing dissolved oxygen near the sea floor from Texas to Louisiana and identifying hypoxia areas or "dead zones," a condition of very low oxygen levels. Near-real-time dead zone information helps minimize the economic impacts to marine resources. With this information, fishermen, decision makers, and the public can monitor agricultural practices that affect marine oxygen levels and the annual cycle of hypoxia development.

Supporting Gulf States Alliance

NCDDC was a key participant in the implementation of the Gulf States Alliance Governors' Action Plan. The Gulf States Alliance is a consortium of the five Gulf of Mexico states (Florida, Alabama, Mississippi, Louisiana, and Texas). This past year, NCDDC supported the Gulf State Alliance efforts to build a digital library and pilot a spatial data viewer for the Gulf region. In addition, NCDDC supported the Priority Habitat Information System (PHINS), a state/Federal partnership intended to provide users with habitat information and geospatial data.

Monitoring and Predicting Harmful Algal Blooms

In a continuing effort to improve harmful algal bloom (HAB) detection and forecasting in the United States and Gulf of Mexico States, NESDIS hosts the Harmful Algal Blooms Observing System (HABSOS). On September 12, 2006, NOAA issued the first Harmful Algal Bloom Bulletin for the

south Texas coast, introducing a new operational capability for the western Gulf of Mexico. HABSOS and other NOAA operational services for HAB monitoring and forecasting directly benefit marine resource management and the fishing industry.

Designing a Regional Ecosystem Portal

NCDDC created a regional ecosystem website designed to be both a gateway to and a management system for diverse, distributed coastal data. This website provides an overview of ecosystem management; access to NOAA's nine ecosystem programs; links to an array of environmental information and projects; and access to Gulf of Mexico regional observing systems. Of particular interest is the Coastal/Marine Ecological Classification Standard (CMECS) prototype, which facilitates data discovery and access.

Severe Weather Planning and Preparation Information Website Created

In the aftermath of Hurricane Katrina, and in preparation for future hurricane seasons, NCDDC developed the comprehensive Coastal Studies, Information, and Data for the Ecosystem (C-SIDE) website. Since the National Weather Service (NWS) has predicted increased tropical activity over the next decade, public access to hurricane-related information is vital. C-SIDE provides direct links to local, state, and Federal information about severe weather preparation, monitoring, and impacts across the Gulf of Mexico coastal region as well as recommendations for home preparation and evacuation, time-sensitive weather products, and storm surge data. This website will also include post-storm assessment, response, and recovery products, information, and services for Gulf Coast residents, offering access to critical information before, during, and after tropical events in the Gulf of Mexico.

Hurricane Katrina Impact Assessment Website

The effects of Hurricane Katrina continue to reverberate along the Gulf Coast and throughout the Nation. The Hurricane Katrina Impact Assessment website provides ecosystem studies, information, and data that has been produced since the storm. This website includes interactive maps with recent coastal and ocean observations. Data includes *in situ* sensor information, coastal circulation modeling, post-Katrina survey data, and photogrammetry, including fixed-wing photography and satellite imagery.

Coral Reefs

Coral Reef Watch in the Field and Online

In the fall of 2005, major bleaching of coral reefs occurred in the Caribbean Sea. Coral bleaching is a biological response to environmental stress whereby the colored algae that live in the corals' tissues are expelled, leaving the coral looking bleached. In response to this event, Coral Reef

Watch began a data collection effort that has continued throughout 2006, resulting in the most well-documented mass bleaching event in history. The ongoing analyses will benefit researchers, managers, and stakeholders, aiding in preparations for future events. Over the past year, Coral Reef Watch has collected over 3,000 observations in the wider Caribbean region, from 50 observers in 28 countries, states, and territories. Many sites reported from 90 to 100 percent of their corals bleached and 50 percent or more mortality of corals. In addition, coral reef managers and scientists around the world can now receive the latest data on thermal stress, which can cause bleaching of coral reefs, in the flexible new Google Earth format. Google Earth, an excellent visualization tool, helps to enliven the data of NOAA's Coral Reef Watch. These products give coastal managers, researchers, and stakeholders advance warning of one to three weeks for bleaching events, allowing them time to prepare for and respond to coral bleaching.

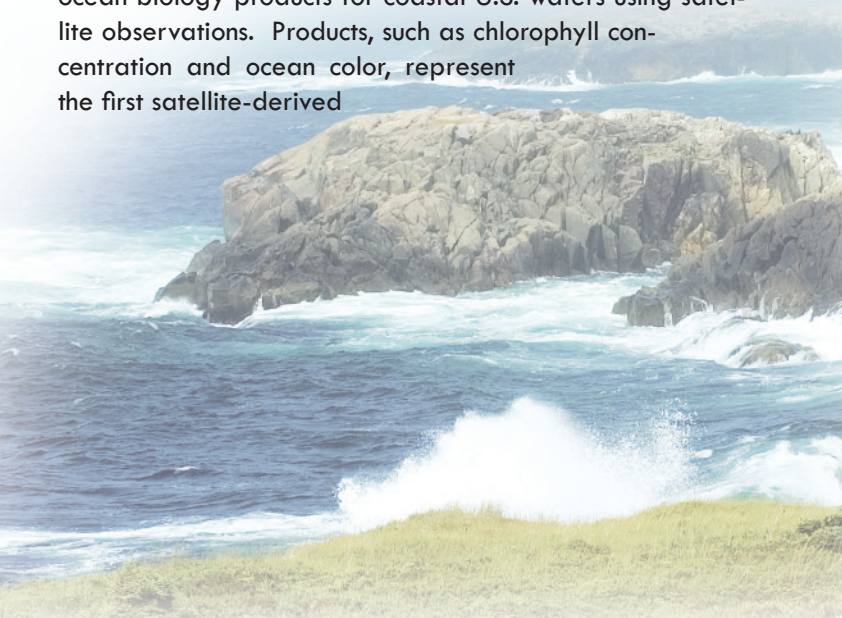
Coral Reef Information System Upgrades

The National Oceanographic Data Center (NODC) manages the NOAA Coral Reef Information System (CoRIS), which provides web-based access to NOAA coral data and information. CoRIS collects metadata that describe coral data; links to online data, products, and publications; and documents instruments and procedures that are vital for long term monitoring of datasets. CoRIS provides coral data products such as coral bleaching alerts and Coral Reef Watch information. In 2006, improvements to the CoRIS website search tool included adding a feature to the text search as well as adding new map search layers. In addition, upgrades to the CoRIS Library pages now provide improved system capabilities for integrated searches of 1,098 publications in the NOAA Central Library.

Ocean Science

Ocean Biology Products Processed and Distributed

In June 2006, the Center for Satellite Applications and Research (STAR) and OSDPD began to process and distribute ocean biology products for coastal U.S. waters using satellite observations. Products, such as chlorophyll concentration and ocean color, represent the first satellite-derived



biological products generated by NESDIS for coastal and open ocean waters. This information is used to monitor HABs, assess regional water quality, and locate suitable habitat for fish and other important marine species.

World Ocean Database Upgraded

The newly upgraded World Ocean Database 2005 (WOD05), released by NODC, is the largest collection of quality-controlled ocean profile data available internationally without restriction. The ocean and climate scientific communities use these datasets to describe and study the ocean. In addition, forecasters use these databases to verify the accuracy of real-time oceanographic data.

NOAA CoastWatch Launches the East Coast Node

NOAA CoastWatch provides ocean remote sensing data for the entire coast line of the United States and the Great Lakes. In June 2006, CoastWatch launched the East Coast Node at the NOAA Chesapeake Bay office. This new node provides online access to a range of diverse data from multiple satellites, including sea surface temperature, ocean surface winds, and levels of chlorophyll-a in the water. Scientists, resource managers, and fishermen use this data to forecast atmospheric events, predict HABs, and detect the presence and distribution of fish and marine mammals. With CoastWatch products, fishermen can find fish in less

time; public health authorities have advance warning of toxic waters; and ships receive timely sea condition forecasts.

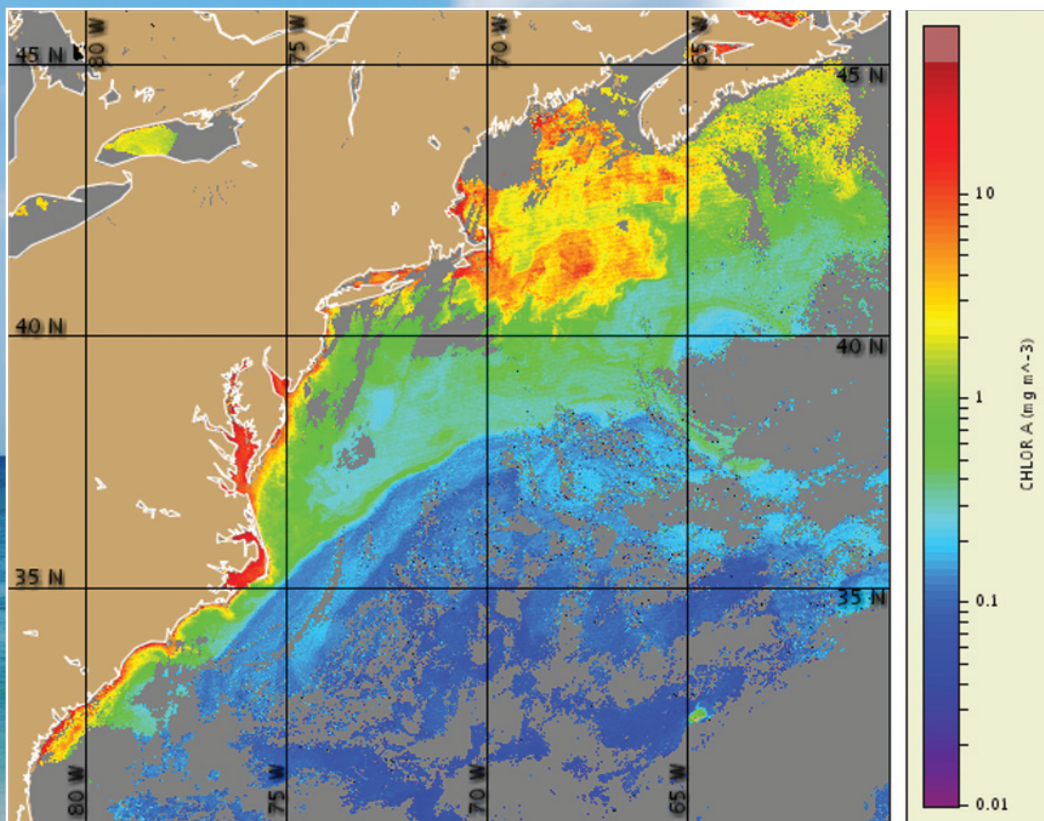


Image of chlorophyll concentrations in the Gulf of Mexico on October 29, 2006. Higher chlorophyll concentrations near the coasts indicate more phytoplankton (small floating ocean plants). This data was made available by NOAA CoastWatch.

Predicting Climate Variability and Change



Access to Data

Data Center Tracks Rapid Arctic Sea Ice Retreat

Researchers at the National Geophysical Data Center's (NGDC's) affiliated National Snow and Ice Data Center (NSIDC) closely tracked the 2006 Arctic sea ice summer retreat—the second lowest minimum recorded since 1978. The lowest summer sea ice minimum was in September 2005. To improve public access to snow and ice data, NSIDC now provides commentary with graphics, maps, and images for any month and for both hemispheres. Average temperatures over most of the Arctic Ocean from January through July 2006 were 1 to 4 degrees Celsius above normal, and sea ice melted relatively rapidly at the beginning of the melt season. Declining sea ice affects arctic animals and the Earth's climate.

Global Vegetation Index Improved

An improved land surface and vegetation dataset for the world's landscape was developed using 25 years of data from the Advanced Very High Resolution Radiometer (AVHRR) instrument on NOAA's polar-orbiting satellites. These data are used to calculate vegetation indices, including the Global Vegetation Index (GVI). This new dataset enhances the ability of GVI to detect long term trends in vegetation cover and monitor droughts, temperature, and moisture effects on the health of vegetation and degradation of land, including deforestation and desertification.

Climate Database Modernization Program Expanded

NOAA's Climate Database Modernization Program (CDMP) has completed its seventh year of rescuing NOAA's climate and environmental data in danger of decay or being lost. The demand for rapid and complete access to global climate data by researchers and global change scientists was key in establishing CDMP. In 2006, over four million CDMP hourly weather records were integrated into the National Climatic Data Center's (NCDC's) digital database, extending records into the 1890s and giving users a more complete picture of the environment.

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

Climate Science

Reconciling Significant Differences in Lower Atmosphere Temperature Trends

The first Climate Change Science Program (CCSP) Synthesis and Assessment Report, "Temperature Trends in the Lower Atmosphere: Steps for Understanding and Reconciling Dif-

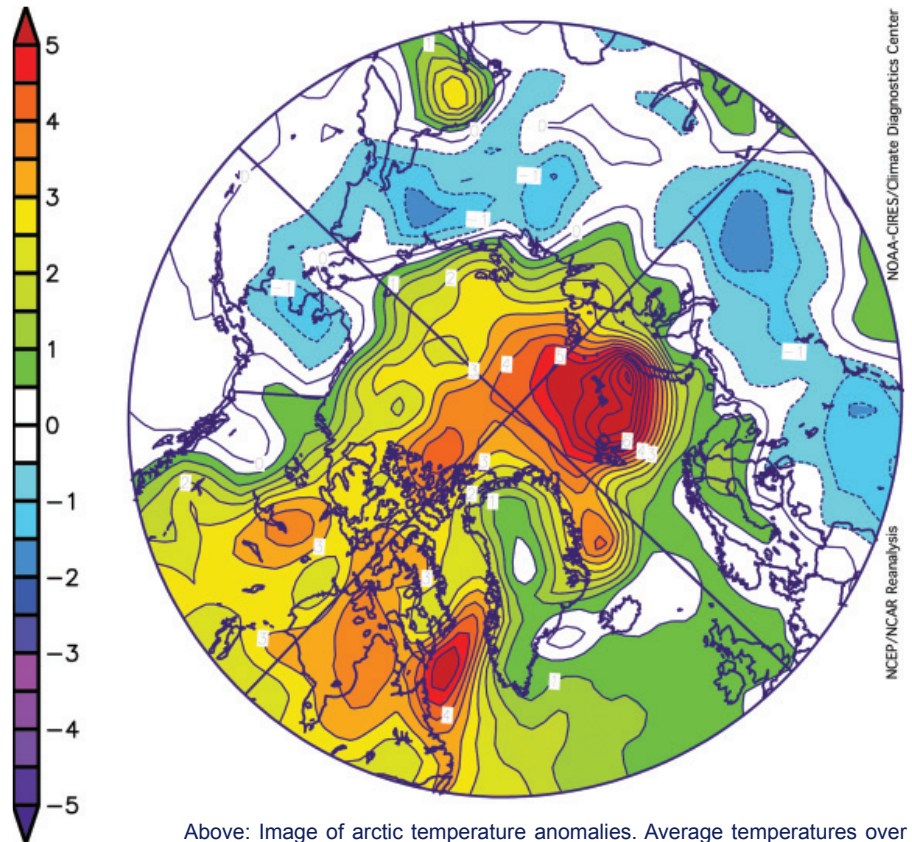
ferences,” was released on May 2, 2006. This report concludes that there is no longer a significant discrepancy between global temperatures measured at the surface with *in situ* observing systems and those measured in the troposphere by satellites and weather balloons. Previous temperature discrepancies in surface and upper-air observations sometimes called into question the validity of climate models, but new evidence of a warming upper and lower troposphere supports the presence of a substantial human impact on global temperature increases.

Microwave Sounder Unit Observes Temperature Trend in Atmosphere

The global-average air temperature at the Earth’s surface is believed to be warming at about 0.17 degree Kelvin (K) per decade. However, the scientific community is debating whether the main part of the atmosphere (the troposphere) is warming or cooling largely because the observed temperature from the Microwave Sounding Unit (MSU) on NOAA polar-orbiting satellites has shown almost no trend in some previous studies. After re-calibrating MSU and producing a new, more accurate dataset, the globally averaged temperature trend of the troposphere over the ocean was recorded as 0.20 degree K per decade, from 1987 to 2003. This trend value suggests that the troposphere is warming slightly faster than the Earth’s surface.

New Hurricane Satellite Dataset Facilitates Climate Research

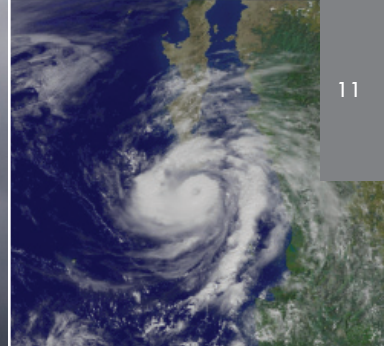
Working with scientists at the University of Wisconsin, NCDC developed a new hurricane satellite dataset that captures satellite observations of tropical cyclones worldwide, in all ocean basins from 1983 to 2005. Research using the data will improve our understanding of the impact of climate variability and change on tropical cyclones. Also, this data will potentially improve seasonal storm forecasts to help emergency planners, save lives, and provide policy makers with more tools for future hurricane season plans.



Above: Image of arctic temperature anomalies. Average temperatures over most of the Arctic Ocean from January through July 2006 were 1 to 4 degrees Celsius above normal. The scale goes from red for temperatures strongly above average to blue/purple for temperatures strongly below average. These anomalies show temperatures compared to the average for 1968 to 1996. Dark blue outlines indicate landmasses.



Providing Weather and Water Information



Hurricanes

Keeping an Eye on Storms

During the 2005 Atlantic Hurricane season, one of the most devastating and busiest storm seasons in recorded history, the two satellite antennas at the National Weather Service (NWS) National Hurricane Center (NHC) were heavily damaged by Hurricane Wilma; one antenna was totally destroyed. As a result, installing a new “hurricane-proof” satellite antenna prior to the start of the 2006 Hurricane season became a high priority for NOAA.

To ensure NHC had an operational antenna when the 2006 Hurricane season started, the Office of Systems Development (OSD) moved an antenna from NOAA’s Suitland Operations Facility to replace the destroyed antenna. In addition, they rebuilt the second antenna. OSD also procured and installed a third antenna that is “hurricane-proof,” which became fully operational on August 1, 2006. Because of this excellent teamwork, NHC now has three satellite antennas that communicate with geostationary satellites and a new hurricane rated system capable of surviving hurricane-force winds while keeping an unceasing, watchful eye on storms.

Saharan Dust Storms May Suppress Hurricane Activity

Many researchers look toward global warming to explain year-to-year changes in tropical storm activity. However,

University of Wisconsin-Madison and NESDIS scientists have found a new possible cause for the variability of these tropical storms: dust storms from Africa. Large dust plumes (clouds) from the Saharan desert may suppress hurricane formation and growth in the Atlantic Ocean. Using data from the Advanced Very High Resolution Radiometer (AVHRR) instrument on the NOAA polar-orbiting satellites (a record that is 25 years long), scientists discovered that few hurricanes formed in years with large amounts of Saharan dust over the Atlantic, while more and stronger tropical storms appeared in years with little dust activity. Saharan dust storms, which were numerous in the summer of 2006, may also explain why so few tropical storms formed in 2006. This information may increase the accuracy of seasonal predictions of hurricane activity.

In 2006, NESDIS 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.

Tsunamis

Maps Created for DART™ Buoy Planning

The National Geophysical Data Center (NGDC) created 20 custom bathymetric (ocean bottom relief) contour maps for

NOAA's National Data Buoy Center (NDBC). These maps are used in shore-side survey planning for proposed Deep-ocean Assessment and Reporting of Tsunamis (DART™) buoy locations, saving ship time and taxpayer dollars on deployment and allowing these buoys to be placed well in regions that would otherwise be poorly mapped. DART™ buoys are used to estimate water levels in the deep ocean.

DART™ Bottom Pressure Recorder Data Now Available

Although infrequent, tsunami waves have caused considerable damage and loss of life in U.S. coastal areas and in regions around the world. NOAA's data archive now offers access to high-resolution Bottom Pressure Recorder (BPR) data from NOAA's DART™ buoys. This archive includes information, observations, technical reports, and, where available, imagery related to tsunami source events and coastal inundations worldwide from 2000 B.C. to the present. The BPR data provide temperature and pressure information for the DART™ locations.

Digital Elevation Models Developed

In 2006, NGDC developed high-resolution digital elevation models (DEMs) for Cape Hatteras, North Carolina; Port San Luis, California; Sand Point, Alaska; Dutch Harbor, Alaska; Mayaguez, Puerto Rico; San Juan, Puerto Rico; Myrtle Beach, South Carolina; and Savannah, Georgia. DEMs are designed to improve forecasting for early tsunami warning systems and for predicting inundation due to tsunami, storm surge, and rainfall flooding in coastal areas.

Improving Data Access

Public Satellite Imagery Web Services Upgraded for 2006 Hurricane Season

The Office of Satellite Data Processing and Distribution (OSDPD) upgraded their website to increase the number of satellite images and ensure the continuity of these images during peak demand and satellite outages. Additions include six new "hurricane floaters," allowing users to view images of one hurricane or tropical storm for the lifetime of the storm. New color enhancements

allow users with disabilities a better way to view images, and users with older computer displays can see important hurricane features. These improvements provide the public and emergency managers quicker access to more and better information.

Making Satellite Data Affordable

In 2006, a final prototype version of the Multi-Constellation User Terminal (MCUT-III) was developed for NOAA to demonstrate the feasibility of using an inexpensive terminal (a single laptop computer) to access data and images from polar-orbiting and geostationary satellites. This effort will help to keep the direct receiving and processing of environmental satellite data affordable for smaller users, such as schools, private citizens, small Numerical Weather Prediction centers, and developing countries.

Northeast Snowfall Impact Scale Implemented

The National Climatic Data Center (NCDC) developed the Northeast Snowfall Impact Scale (NESIS) to give the public a new, easy-to-understand scale to categorize major snowstorms, similar to the categories used for tornadoes and hurricanes. NESIS ranks the severity of East Coast snowstorms based on the amount of snowfall and the population in the affected areas. With NESIS, scientists at NCDC can quickly assess a snowstorm's impact today, compare it with a storm of the past, and assign it a Notable, Significant, Major, Crippling, or Extreme category.

Providing Resources for Water Managers

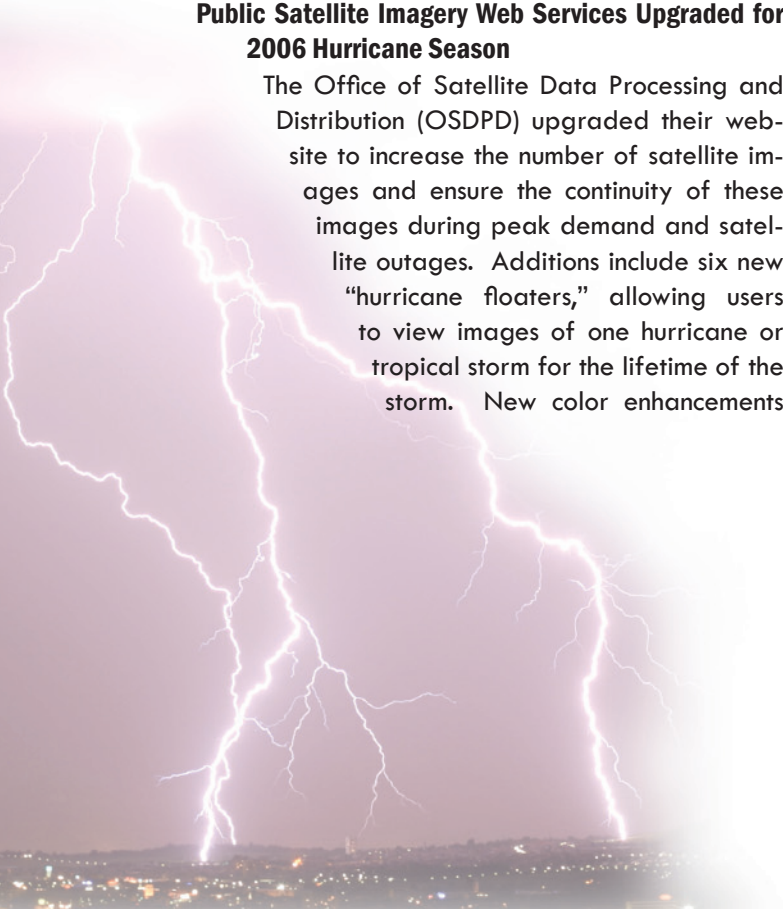
NCDC and several partners developed a series of small, regional workshops for water managers. These workshops improve coordination and communication and ensure access to high-quality information for water resource managers and decision makers. In addition to the workshops, NCDC developed a companion online resource for water managers, called TreeFlow. The TreeFlow resources offer several benefits: access to highly technical information for a broad audience of nonspecialists; a comprehensive dataset source; and a public resource describing the connection between climate and water availability.

Improved Access to Key National Weather Service Datasets

Because of advances made by NCDC, the National Operational Model Archive and Distribution System (NOMADS) now provides online public access to the new NWS National Digital Forecast Database (NDFD), which contains the most up-to-date weather information. NOMADS also provides access to legally mandated historical official products, watches, warnings, and advisories.

Improving Forecasting and Monitoring Microwave Products Blended for Precipitation Forecasting

In 2006, data from multiple products were combined to



monitor the transport of large areas of very high atmospheric moisture. Scientists can now merge data from satellite sensors and a dense network of U.S. based Global Positioning System (GPS) instruments to form a unique global Total Precipitable Water (TPW) information product. Comparing current TPW data against historical data can show areas where atmospheric moisture is well above or below levels typical for that time period. Persistent TPW anomalies over a given area can signal the potential for flooding or heavy snowfall, and this additional warning time can save money and lives.

Ozone Monitoring Products Enhanced

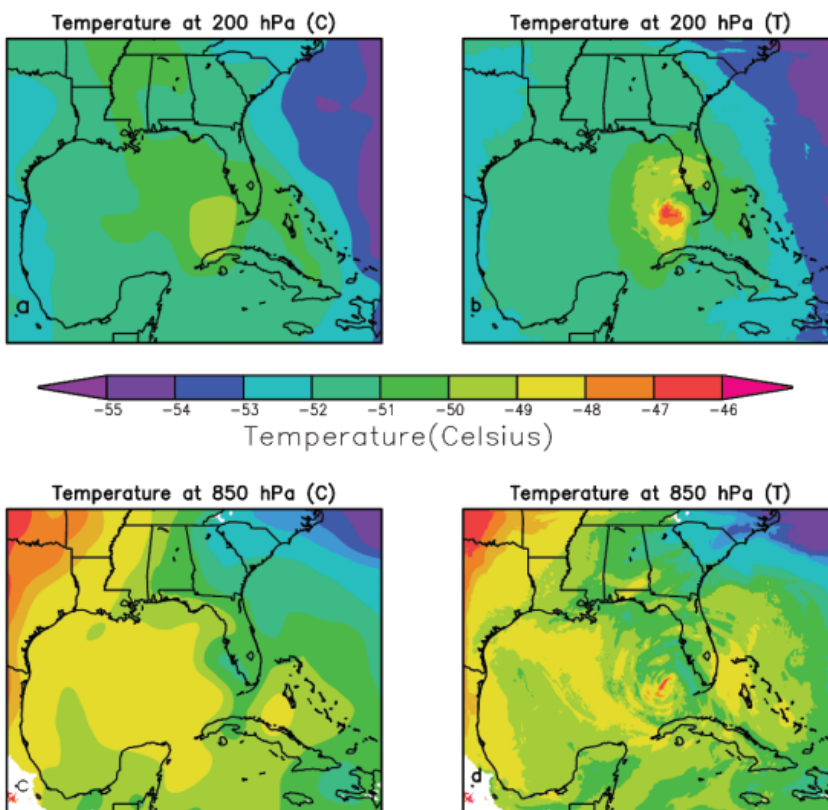
Since 1985, NOAA has been creating total ozone profile products to monitor changes in atmospheric ozone. While ozone near the Earth's surface is a pollutant, ozone in the atmosphere is a trace gas critical to life, protecting plants and animals by absorbing harmful ultraviolet (UV) radiation from the Sun. Ozone information is provided to environmental modeling agencies around the world for weather and climate models and UV forecasts. Recent significant improvements to the calibration of the ozone data-gathering instruments have created more complete and reliable ozone profiles.

Forecasters Using Enhanced GOES Sounder Products

NESDIS views atmospheric and surface properties using measurements from sounder instruments on the Geostationary Operational Environmental Satellites (GOES). To enhance these data, NESDIS scientists have implemented a new GOES sounder processing system that produces products at full resolution without loss of quality or timeliness. The additional information and sharper presentation of the high resolution products allow more timely and specific severe weather warnings.

Two High Resolution Sea Surface Temperature Analyses Introduced

To improve weather forecasts (including hurricane tracking) and monitoring of fish populations, NCDC developed two new high resolution sea surface temperature (SST) analyses that convert irregularly sampled data onto a regular grid. These daily SST analyses provide better resolution than the previous weekly analysis, use satellite and *in situ* data from ships and buoys, and can obtain data even when clouds are present.



For the first time, observations of microwave radiances are assimilated into a weather forecast model. Here, the radiance observations are from the Special Sensor Microwave Imager and Sounder instrument on the DMSP satellite. The new data assimilation technique improves the analysis of temperature fields (shown in the right panels) at two levels in Hurricane Katrina, compared with the same fields in the control run, in the left panels.

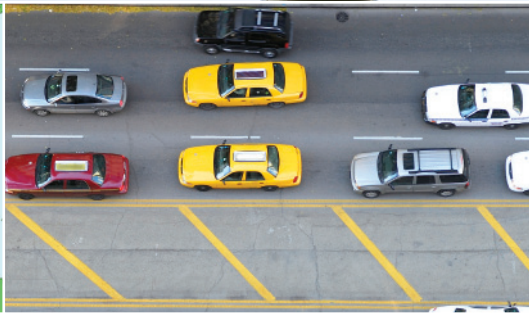
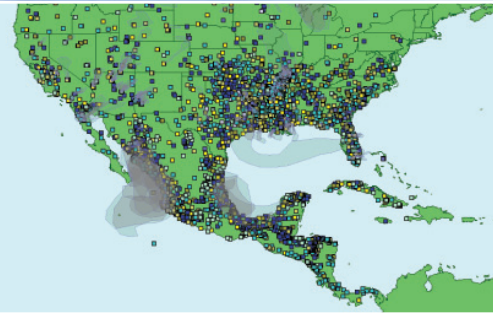
Working to Improve Severe Weather Forecasts

During the 2006 Hurricane season, the Center for Satellite Applications and Research (STAR) and OSDPD began operating the Tropical Cyclone Formation Probability (TCFP) product. This new product determines the probability that a tropical cyclone will form within the next 24 hours, and it also indicates areas where storm formation is more likely than normal. In addition, NESDIS and NWS are now using new forecasting models that enable more detailed images and produce better severe weather forecasts. Also, signals from GPS satellites are now used to probe the atmosphere and assist in forecasting weather. These accomplishments have greatly increased the ability to monitor, track, and predict severe weather.

Increased Weather Radar Data Now Available

NCDC is now receiving Next Generation Radar Data (NEXRAD) from Canada and Korea. These data are received in near-real-time. NCDC is working with the NWS National Severe Storms Laboratory (NSSL) to support the National Mosaic and Multi-Sensor Quantitative Precipitation Estimates (NMQ). NMQ generates three-dimensional radar views and multiple rainfall products. NMQ will improve precipitation estimates and assist in precipitation classification (snow, rain, sleet, etc.), allowing for better estimates of precipitation type, forecasted location, and expected amount.

Supporting Commerce and Transportation



Several NESDIS 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.

The NOAA-operated SAR-

SAT system can quickly detect and locate distress signals from emergency beacons on board aircraft and boats and from hand-held personal locator beacons almost anywhere in the world at any time and in almost any condition. The satellites relay distress signals from the emergency beacons to a network of ground stations and ultimately to the U.S. Mission Control Center (USMCC). USMCC processes the distress signal and alerts the appropriate search and rescue authorities. As of December 31, 2006, 272 people were rescued because of the COSPAS-SARSAT system.

First Joint U.S./Mexico Fire and Smoke Analysis

In late 2005, a joint Hazard Mapping System (HMS) agreement was developed between the United States and Mexico, and the first operational Smoke and Fire Analysis was released to the public on May 11, 2006. The HMS tool

allows scientists to analyze smoke and fires. In 2005, the government of Mexico participated in joint training sessions with NOAA to learn how to use HMS to analyze the thousands of wildfires that burn in Mexico every summer and to assist NOAA scientists in detecting smoke that usually travels into the Southern United States. Users can now view fires as they are analyzed and track dense smoke to its source. In addition, the environmental modeling community can now build more accurate smoke trajectory models, ensuring safe and efficient air and maritime travel and commerce.

NOAA Hosts Commercial Remote Sensing Satellite Symposium

On September 13-15, 2006, NOAA convened a second International Commercial Remote Sensing Satellite Symposium. This symposium brought together international business and government leaders to explore the current issues facing the commercial remote sensing (CRS) satellite sector. Over 200 government and industry leaders from around the world attended the symposium. Topics discussed included the CRS business landscape; the future of the CRS marketplace; the CRS connection to the Global Earth Observation System of Systems (GEOSS); and natural disaster assessment and response. A robust American CRS industry benefits the public by providing products such as mapping data, weather information, and improved navigational aids and provides Americans with jobs in this growing industry.

NESDIS COMMUNITY

NOAA Celebrates 200 Years of Science, Service, and Stewardship

Throughout 2006, NESDIS participated in preparations for a year-long celebration in honor of 200 years of the NOAA vision. In 2007, through a comprehensive website, open houses, innovative exhibits, and a variety of other memorable events within and outside of the Washington, DC, area, NESDIS will join the other NOAA offices and centers to tell the NOAA story to the American people. We will demonstrate how our past, present, and future science, service, and stewardship contribute to a healthy and vital society and economy.

NOAA Library Upgrades Resources

In 2006, the NOAA Central Library successfully implemented the fifth NOAA-wide online resource with the addition of the Web of Science, the online version of Science Citation Index. From their desktops, all NOAA staff can now locate citations by author, subject, or title from over 8,700 scientific journals. The current NOAA-wide resources are Aquatic Sciences and Fisheries Abstracts (ASFA), BioOne, JSTOR, netLibrary, ISI Web of Science, and NOAA LINC Database Activity.

NOAA Library Reaches Out

In 2006, the NOAA Central Library hosted several activities for all ages to enjoy. On April 2-8, 2006, National Library Week was celebrated with an open house, database demonstrations, and daily library information quizzes. On April 28, 2006, over 142 children, ages 6 and under, participated in "Bring Your Child to Work Day" activities at the Library. On November 1, 2006, the Library hosted its 13th Annual Book Fair. More than 200 people visited the display by Association Book Exhibits, which contained over 120 books from 31 publishers covering fisheries, oceanography, climatology, meteorology, and remote sensing.

The NOAA Central Library also hosted 32 Brown Bag Lunch Seminar Programs throughout the year presented by NOAA administrators, staff, visiting scholars, and related organizations. One of the many popular programs included a talk by Dr. Jon A. Krosnick, Professor of Humanities and Social Sciences at Stanford University, who discussed "What Ameri-

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



cans Really Think About Climate Change: Attitude Formation and Change in Response to a Raging Scientific Controversy" on November 29, 2006.

NOAA Environmental Hero Award

Established in 1995, the Environmental Hero Award is presented to individuals and organizations that volunteer their time and energy to help NOAA carry out its mission. The National Climatic Data Center (NCDC) nominated George Briggs of the North Carolina Arboretum this year. George Briggs, as the first Executive Director of the North Carolina Arboretum, led the creation of one of the finest environmental preservation and education sites in the southeast. His dedication to understanding climate led to a collaborative effort with NOAA on the U.S. Climate Reference Network and the successful installation of the network's first station on the Arboretum.



2006 AWARD RECIPIENTS

2006 Administrator's Awards

Dr. Sharon Leduc, NCDC

Category: Administrative Support

Certificate Citation: For negotiating a new collective bargaining agreement over a brief period of time and for implementing scientific review procedures for publication, all while providing exemplary management of the National Climatic Data Center.

Connie A. Woodhouse, NCDC

Category: Scientific Research

Certificate Citation: For pioneering climate research and outreach to water resource managers which provided understanding of water availability for the period of time before rain gauges existed in the Western United States.

Charles S. Bryant, OSD

Category: Engineering Development

Certificate Citation: For outstanding leadership and engineering in restoring the National Hurricane Center to full operational capability prior to the start of the 2006 hurricane season.

Robert H. Levin, OSDPD

Category: Excellence in Information Systems

Certificate Citation: For designing, implementing, and maintaining an innovative system to improve POES data monitoring, quality control, and analysis critical to the NESDIS mission.

Alfreda M. Alexander, OSDPD

Category: Administrative Support

Certificate Citation: For superior achievement in administrative support by significantly improving the efficiency and effectiveness of telecommunication services for the Satellite Services Division.

Dr. Kenneth S. Casey, NODC

Category: Scientific Research

Certificate Citation: For implementing the latest Pathfinder V5 dataset leading to marked improvements over previously available datasets, including a finer spatial resolution, greater use of ice masks in quality level determinations, and inclusion of coastal and inland waters.

Tim Boyer, NODC

Olga K. Baranova, NODC

Category: Excellence in Information Systems

Certificate Citation: For exceptional initiative in developing WODselect, which allows unprecedented, online access to the World Ocean Database, the world's largest collection of ocean profile data.

2006 NOAA Technology Transfer Award

Peter M. Steurer, NCDC

Certificate Citation: For developing an Air Freezing Index that was transferred to the U.S. Construction Industry in the building of Frost Protected Shallow Foundations, producing significant savings to homeowners and the environment.

2006 Department of Commerce Silver Medal

Joseph W. Stinus, NODC, NCDDC

Russell Beard, NODC, NCDDC

Elizabeth Schenk-Gardner, NODC, NCDDC

Susan M. Starke, NODC, NCDDC

Eric Roby, NODC, NCDDC

Bradlee B. Nunn, NODC, NCDDC

Mary E. O'Chery, NODC, NCDDC

Sharon M. Mesick, NODC, NCDDC

Julie A. Bosch, NODC, NCDDC

Category: Customer Service

The group was honored for dedication and service in restoring operations to the National Coastal Data Development Center (NCDDC) within days after the devastating effects of Hurricane Katrina. The group's actions included assisting in the recovery of staff and others who lost their homes and possessions and developing a Katrina website to link/access imagery, data, maps, and models to assist in recovery programs. Within 60 days, this website had over 1.5 million hits. NCDDC also assisted state agencies in replacing lost equipment and data to restore their operations.

2006 NOAA Bronze Medals

NESDIS Nominations

Steven Ansari, NCDC

For outstanding support to the NOAA NEXRAD radar program by developing radar display and data exporter tools.

Ray "Ted" Habermann, NGDC

For leading a standards-based systems development effort in support of the NOAA Observing System Architecture (NOSA).

Brian Hughes, OSDPD

Thomas Renkevans, GOES-R

For designing and implementing a backup system to eliminate a critical single point of failure for NOAA satellite imagery, thus ensuring continuity of mission critical operations.

Roger Heymann, OSD

Timothy Schmit, ORA/STAR

For reducing costs and increasing satellite Earth science global data distribution and archiving through world-leading R&D in data compression.

Glenn Rutledge, NCDC

Jordan Alpert, NWS

Wesley Ebisuzaki, NWS

Steven Hankin, OAR

Ronald Stouffer, OAR

Keith Dixon, OAR

For development of the NOAA Operational Model Archive

and Distribution System, the first operational U.S. National climate and weather model archive.

Fuzhong Weng, ORA/STAR

Changyong Cao, ORA/STAR

Tsan Mo, ORA/STAR

Xiangqian Wu, ORA/STAR

Jerry Sullivan, ORA/STAR

Thomas Kleespies, ORA/STAR

Michael Chalfant, ORA/STAR

Anthony Reale, ORA/STAR

Alexander Ignatov, ORA/STAR

Lawrence Flynn, ORA/STAR

For developing an integrated system for accurately calibrating NOAA-18 instruments that lead to a high quality of operational satellite products.

LCDR John Adler

Howard Diamond, NCDC

John Jones, NWS

Thomas Karl, NCDC

Lewis McCulloch, NESDIS AA Office

Linda Moodie, NESDIS IIA Office

Peter Steurer, NCDC

Marcia Weaks, NOS

For development of the Strategic Plan for the U.S. Integrated Earth Observation System and leading 18 Federal agencies to advance the system.

Thomas Baldwin, OSDPD

Alonzo Brown, OSDPD

Gregory Gallina, OSDPD

Jay Hanna, OSDPD

Brian Hughes, OSDPD

Charles Kadin, OSDPD

Jamie Kibler, OSDPD

Sheldon Kusselson, OSDPD

Nancy Merckle, OSDPD

Mark Ruminski, OSDPD

Alan Schwartz, OSDPD

John Simko, OSDPD

David Streett, OSDPD

Grace Swanson, OSDPD

Michael Turk, OSDPD

Regis Walter, OSDPD

For providing operational satellite analysis support to the National Weather Service and other government organizations during Hurricane Katrina.

Keith Mann, OSO

Dennis Mailhot, OSO

Michael Settles, OSO



Albert McMath, OSO
Greg Johnson, OSO
Diane Robinson, OSO
Gary McBrien, OSO
Mark Noto, (formerly of NESDIS CIO)
Eric Clemons, OSD

For developing the GOES Certification and Accreditation (C&A) package, the first NOAA National Critical system accredited, and a C&A system used as a model across the Department of Commerce.

Dawn W. Anders, NCDC
William O. Brown, NCDC
Katherine A. Fincher, NCDC
Sharon K. Hawkins, NCDC
Cynthia B. Karl, NCDC
Douglas G. McElreath, NCDC

Tammy Scott, NCDC
Margaret K. Tessier, NCDC
Janet S. Wall, NCDC

Mary B. Hollinger, NODC
Kathleen A. Martin, (formerly of NGDC)
Robin R. Warnken, NGDC

For implementing an e-Government system across three NESDIS Data Centers which processes all orders for digital and non-digital data.

Bronze Nominations submitted by other offices

Toni Parham, NESDIS, AA, CFO/CAO

This is an Acquisitions and Grants Office (AGO) group nomination. For supporting the President's Management Agenda (PMA) initiative in achieving organizational excellence by strengthening NOAA's financial and administrative services through an integrated team of line office and grants office personnel.

Regis Walter, OSDPD

This is an Office of the Chief Information Officer (CIO) group nomination. For outstanding services provided to the Department of Homeland Security in its response to the 2005 Hurricane Season.

Jane D'Aguanno, NESDIS AA Office

David Urbanski, NCDC

This is an Office of the Chief Information Officer (CIO) group nomination. For the design and execution of a Continuity of Operations exercise, which improved NOAA's ability to continue essential functions during all circumstances, including life-threatening weather events or terrorist attacks.

Jane D'Aguanno, NESDIS AA Office

Roberta McQuilkin, NESDIS AA Office

This is an Office of the Chief Information Officer (CIO) group nomination. For providing unified emergency response and

incident management during Hurricanes Katrina and Rita by establishing national-level, inter-agency coordination, establishing priorities, and supporting deployed and impacted employees and assets.

Steve Ansari, NCDC

Terry Babb, (formerly of OSO)

Phillip Johnson, OSO

Linda Salyers, NODC

Benjamin Watkins, NCDC

This is a National Weather Service group nomination. For voluntary service provided during FEMA post-disaster relief operations after multiple hurricane strikes in 2005.

Paula Dunbar, NGDC

This is a National Weather Service group nomination. For personal and professional excellence as the Nation's experts and spokespersons on tsunamis following the December 26, 2004, Indian Ocean tsunami.

Imke Durre, NCDC

Jay Lawrimore, NCDC

Thomas Peterson, NCDC

This is a Office of Oceanic and Atmospheric Research (OAR) group nomination. For developing research-quality radio-sonde atmospheric temperature datasets for reliably monitoring climate variations and change.

2006 NESDIS Distinguished Career Award Recipients

Helen Coffey, NGDC

For environmental data stewardship which has helped establish NOAA as a leader in preserving and maintaining long-term archives of historical solar-geophysical data.

John Kinsfather, NGDC

For exemplary, innovative and sustained leadership in keeping NOAA's National Data Centers at the forefront of the rapidly evolving information technology environment.

W. Paul Menzel, formerly of ORA/STAR

For innovative contributions and international leadership in the field of satellite remote sensing, resulting in improved measurements, applications, and understanding of global weather and climate.

Michael Mignogno, OSD

For leadership and professional achievements in successfully planning and executing NOAA's polar satellite program and remote sensing activity.

NOAA Team Member of the Month for February 2006

Mark Hyde, IPO

For his critical role in the installation of a communications system at the Suitland, Maryland, facility to support the

next generation National Polar-orbiting Operational Environmental Satellite System (NPOESS).

NOAA Employee of the Month for May 2006

Steve Ansari, NCDC

For excellence in development of Geographic Information Systems (GIS) tools that have wide application for federal agencies, the private sector, and universities.

NOAA Team Member of the Month for September 2006

Wei Guo, STAR

For exceptional work in development, improvement, and implementation of satellite based estimates of land surface characteristics and the products derived from them.

NOAA Employee of the Month for December 2006

Cathy Nichols, OSDPD

For significant contributions as the lead systems integrator in the provision of satellite data processing services while OSDPD switched operational hardware and software systems and in coordinating the Information Processing Division's successful move to NSOF.

The following employees received a Unit Citation from NOAA:

Jamie Kibler

Grace Swanson

Alonzo Brown

Mark Ruminski

Davida Streett

Regis Walter

Greg Gallina

Nancy Merckle

Alan Schwartz

Thomas Baldwin

Michael Turk

OSDPD, SSD

The employees who man the 24 by 7 Tropical Desk of the Satellite Analysis Branch (SAB) are recognized for providing exemplary satellite-based operational support to the National Weather Service (NWS) for the extremely active 2005 tropical storm season.

External Award

Arthur S. Flemming Award

Dr. David M. Anderson, NCDC

Dr. Anderson was honored for excellence in paleoclimatology research for promoting the use, visibility, and availability of pre-instrumental climate data. His work with colleagues from the United States and India provided novel reconstructions of major aspects of the climate system, including the Asian monsoon, El Niño, and the carbon cycle; all processes are relevant to NOAA goals in understanding the climate system. Beginning in 2002, Dr. Anderson published four articles on these topics in *Science and Nature*, in just over one year. His research not only provides long-term records of pre-instrumental climate, including the first multi-century reconstruction of the Southwest Asian monsoon, but also advances our understanding of how key climate processes have varied through time.



NOAA SATELLITE AND INFORMATION SERVICE EMPLOYEES

ANTONIO A. ABADIA DIANA L. ABNEY STANLEY JOHN ABNEY MARY ADAMS ANDREW L. ADKINS, JR. CAROLYN W. ALDERMAN ALFREDA M. ALEXANDER ANDREW J. ALLEGRA DONALD L. ALLEN KHALID M. ALVI KEITH AMBURGEY DAWN W. ANDERS DONNA M. ANDERSON DOROTHY LAMAR ANDERSON MICHAEL J. ANDERSON GLORIA E. ANDERSON DAVID M. ANDERSON WILLIAM E. ANGEL FRED A. ANNIS STEVEN R. ANSARI JIMI ROBERT ANZELC CHARLENE JO APPERSON ANTHONY ARGUEZ JEFFREY D. ARNFIELD STEVEN M. ATKINS ROBERT M. AUNE CAROL A. AUSTIN LYNNE P. AXTELL TERRY VINCENT BABB SHYAM N. BAJPAI CLIFFORD B. BAKER EDWARD M. BAKER CHARLES S. BAKER RICHARD T. BALDWIN THOMAS BALDWIN ANNE O'DONNELL BALL JAMES G. BALLOU BARBARAA. BANKS WALID JUBRAIL BANNOURA OLGA KONSTANTINOVNA BARANOVA BRUCE R. BARKSTROM CHRISTOPHER DWIGHT BARNET ALVA J. BARNETTE CELSO S. BARIENTOS ANDREW D. BARTON JOHN J. BATES BRUCE BAUER ERIC JUDSON BAYLER RUSSELL H. BEARD JANICE A. BEATTIE MICHAEL R. BEAVIN THOMAS WILLIAM BECKER KATHY P. BELFIELD TONI DENISE BELLAMY PHYLLIS BELLAMY PATRICK S. BELOTE DAVID ARTHUR BENNER PAULA E. BERRY EUGENE J. BERRY MARGARET E. BIGGERSTAFF FREEMAN B. BLACKWELL, JR. ILISSA BLECH BRIAN G. BLOEDEL HAL J. BLOOM MATTHEW W. BODOSKY MARK J. BOLAND JULIE A. BOSCH LISA DIANE BOTLUK KARENA A. BOWIE DAVID P. BOWMAN THOMAS LEROY BOYD TIMOTHY PAUL BOYER CAROLYN C. BRADFORD JAMES E. BRADY DOUGLAS D. BRAUER DEBRA S. BRAUN CAROL JANE BREGER MARK S. BRIELE DANNY E. BRINEGAR RANDAL B. BRINKER DONNISE P. BROOKS FRANCES BROOKS RICHARD C. BROOKS BARBARA D. BROOKS TODD HOWELL BROOKS JANET M. BROWN WILLIAM O. BROWN DAVID EARL BROWN ALONZO MCCARROL BROWN CHRISTOPHER W. BROWN LINDA A. BROWN DANIEL R. BROWN, JR. DOROTHY BROWN CYNTHIA BROWN EMILIE S. BRUCHON ALBERTA BRUNSON JOSEPH P. BRUST, JR. CHARLES S. BRYANT JULIE J. BRYANT DONNA S. BUCKLEY CHARLES RODNEY BUCKNER RONALD W. BUHMANN JUSTIN ELLOT BURKET WILLIAM CARY BURKHART THEODORE THOMAS BURLEW, JR. ROBIN SURRETT BURRESS MARY R. BURRIS THOMAS R. BUTTON HYRE BYSAL PATRICK C. CALDWELL CHERYL A. CALDWELL LOUIS P. CAMBARDELLA JOHN G. CAMPAGNOLI JOHN S. CANTER CHANGYONG CAO SHARON D. CAPPS HILL THOMAS R. CAREY JAN ANITA CARPENTER CHRISTINE MARY CARPINO LARRY W. CARR LILA P. CARR DONALD M. CARROLL PRESTON S. CARTER EMILY M. CARTER STEVEN L. CARTER WILLIAM ANDREW CARTER LILLIAN R. CARTER SHIRLEY S. CARTER CHRISTOPHER CARTWRIGHT KENNETH SCOTT CASEY JOSEPH K. CATALAN BARBARA P. CATRETT REBECCA CHACKO MICHAEL W. CHALFANT KIMBERLY K. CHAMBERLAIN STANLEY YEE CHING CHAN GORDON MARION CHANCEY PAUL SZE PO CHANG LAURA M. CHAPMAN DOUGLAS C. CHARNOCK, JR. SAM MING SAN CHEN HOMER LEE CHERRIX TROY A. CHERRY ROSA MARIE CHIEDI LUKMAN HIDAYAT CHOLID DAVID M. CLARK CRAIGA. CLARK DEBRA E. CLARK JOHNNY R. CLARK, JR. NATHAN BLAINE CLARK PABLO CLEMENTE COLON ERIC C. CLEMONS HELEN E. COFFEY MORRIS H. COLE CARLA L. COLEMAN BERRY K. COLEMAN RICHARD A. COLEY SHARON D. COLLEY KAY E. COLLINS DONALD W. COLLINS ANTHONY B. COMBERIATE GUSTAVE JULES COMEYNE, III LAURENCE N. CONNOR JEAN REDMOND CONRAD BARBARA COOK BRENDA A. COOKE DENNIS B. COPE THERESSA D. COREN JUSTIN G. COUTURE ARLENE A. CRAIG MICHAEL L. CRANE VAN D. CRAWFORD ANGELA L. CRENSHAW MICHAEL JAMES CRISON DENNIS E. CROCKETT SCOTT L. CROSS JUSTIN A. CROUCH ANDREW X. CROUSE RUBY E. CUBANO MARY L. CUMBERPATCH BRENDA LEE CUMBIE JOHN T. CUSTIS JANE ANN D'AGUANNO CAROLYN D'ANTONIO HARRY W. DAHLBERG, JR. KEVIN ANDREW DAILEY JAIME MICHAEL DANIELS GARY K. DAVIS JOHN W. DAVIS, JR. VAUGHN W. DAVIS, JR. STEPHEN A. DELGREGO CLAUDE D. DELLINGER MARK DEMARIA WILLIAM F. DENIG SUSAN DEVINE HOWARD J. DIAMOND BENJAMIN LOWELL DIETRICH PAUL M. DIGIACOMO HANJUN DING KATHY DINKINS GERALD JOHN DITTBERNER JOSEPH F. DORFLER WARREN FRANCIS DORSEY JEROME W. DORSEY EVE A. DOUGLAS HENRY F. DRAHOS, JR. LISELLE MARIE DRAKE PAULA K. DUNBAR PATRICK D. DUNSTON MICHAEL R. DURAN IMKE DURRE PARMESH H. DWIVEDI RUSSELL DYSON CARLSON MARK EAKIN TINA MARIE EAST DAVID R. EASTERLING DENNIS E. EBERTS DAVID MICHAEL EDDY LEON M. ELLISON STANLEY W. ELSWICK CHRISTOPHER DAVID ELVIDGE MARCUS O. ERTLE EDWARD H. ERWIN TERRI J. ESHAM CRAIG JOSEPH EVANEGO ELIZABETH F. EWELL WAYNE M. FAAS JOHN R. FAUERBACH LISA A. FAUNCE CHARLES J. FENNO CHRISTINE DELORIS FENWICK ANGELA D. FERGUSON ALICIA C. FERGUSON RALPH R. FERRARO, JR. KATHERINE A. FINCHER ROBERT S. FINSON ANNA FIOLEK JEAN M. FITCH MICHAEL W. FITZMAURICE, JR. DANIEL G. FLANAGAN ROBERT P. FLEEMAN STEPHEN E. FLEMING KAREN E. FLERLAGE LAWRENCE FLYNN TERRI LYNNE FORD BERNADETTE G. FOREMAN DAVID GAY FORSYTH CHRISTOPHER G. FOX DAVID NEIL FRANC DEBORAH L. FRANKLIN PHALA L. FRANKS HELEN V. FREDERICK RICHARD W. FREEMAN GREGG W. FROSTROM PAUL B. FULENWIDER RICHARD ALAN FULTON DAVID R. FURLONG MICHAEL B. GALEONE GREGORY M. GALLINA KEVIN P. GALLO HERNAN EDUARDO GARCIA NANCY CORY GARDNER RICHARD LEWIS GAREY TEVIS C. GEHR ROBERT DAVID GELFELD HELEN J. GIBSON VICENTE ALVES GILBERTO KARIN LYNN GLEASON BYRON E. GLEASON HILDA S. GOHRBAND MITCHELL D. GOLDBERG DAVID NELSON GOLDSMITH ZACHARY G. GOLDSTEIN GEOFFREY P. GOODRUM LYNN A. GOSS JAMES J. GOUDOUIROS VINCENT GRANO AXEL GRAUMANN DONALD G. GRAY JOSEPH P. GREEN VANESSA L. GRIFFIN LARRY J. GRIFFIN MARY A. GRIFFIN TRINA M. GRIFFIN STEVEN M. GRIFFITH DORIA B. GRIMES PETER L. GRIMM BYRON GRISHAM, III WENDY S. GROSS INGRID C. GUCH JAMES J. GURKA JOSE M. GUTIERREZ NATHANIEL B. GUTTMAN RAY E. HABERMANN IDA MARIE HAKKARINEN NORMAN F. HALL ALAN HALL THOMAS E. HALL DEVERY L. HALL MARK O. HALL EDWARD C. HAMBLIN MELANIE A. HAMILTON GREGORY R. HAMMER ANDRE LAMAR HAMMOND CYNTHIA HAMPTON HAN YONG DONG JICK HAN JING NMN HAN JAY W. HANNA JERRY D. HARDY EMILY D. HARROD DAVID S. HASENAUER JAMES S. HAUGHEY SHARON K. HAWKINS BRENNAN J. HAY KENNETH HAYWOOD ANDREW K. HEIDINGER LISA K. HEILMEIER RICHARD R. HEIM, JR. MICHAEL R. HELFERT SEAN R. HELFRICH GRACE M. HENSLEY DAVID K. HERMRECK RHONDA L. HERNDON ROGER W. HEYMANN BRIAN K. HILL DONALD W. HILLGER CONRAD S. HINSON OLIVER DAVID HIRSCHFELD CURTIS W. HOLLAND MARY BEAN HOLLINGER LOUIE E. HOFF KAREN ENGLAND HORAN SEYED A. HOSSEINI TAMARA G. HOUSTON JASON L. HOWARD PAUL E. HURDSPATH PATRICIA A. HUFF JOHN P. HUGHES BRIAN K. HUGHES PAMELA Y. HUGHES KENT H. HUGHES STACEY J. HURCOMBE LISA S. HURT TOBY M. HUTCHINGS GLENN M. HYATT ALEXANDER IGNATOV JOYA A. IKELMAN CHERYL L. INGRAM ANTONIO R. IRVING DAVID CRAWFORD IRWIN SCOTT E. JACKSON NINA L. JACKSON CONRAD G. JACKSON STACI M. JACKSON JONES RUSSELL L. JACOBS LAWRENCE S. JAMES RICHARD FLOYD JAMES STEPHEN J. JANOSKI SARAH A. JENKINS JOHN A. JENSEN MICHAEL D. JENSEN MATTHEW ANTON JOCHUM DAPHNE R. JOHNSON CHERYL MAE JOHNSON GREGORY P. JOHNSON PHILLIP STEPHEN JOHNSON DENNIS L. JOHNSON MARIA N. JONES QUEEN E. JONES CHARLES KADIN CYNTHIA B. KARL THOMAS R. KARL MARIAN ELLEN KATZ MARILENE S. KAZIOR KATHLEEN A. KELLY JAMES S. KETCHUM, JR. JEFFREY R. KEY JAMIE MATTHEW KIBLER MARY E. KICZA ERIC A. KIHN DONGSOO KIM JASON Y. KIM BEVERLY C. KING CHRISTOPHER S. KINKADE JOHN O. KINSFATHER PATRICIA E. KIRK STEVEN P. 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