



EARTH SYSTEM MONITOR

The Hidden Gems within NESDIS

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NOAA's data and
information
services**

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Sharing the Planet, Sharing the Data



**U.S. Department
of Commerce
National Oceanic
and Atmospheric
Administration**

Margarita Conkright Gregg, Director, Ph.D., National Oceanographic Data Center; Sharon Leduc, Ph.D., Acting Director, National Climatic Data Center; and Christopher Fox, Ph.D., Director, National Geophysical Data Center

NOA's Satellite and Information Service (NESDIS) launches satellites and provides the weather service with the data critical for forecasting hurricanes, tornadoes, and perfect spring days. In addition to this, NESDIS ensures these data, acquired at great cost, are preserved for future generations. The three NESDIS Data Centers are the stewards for the Nation's climate, geophysical, and oceanographic data and information. We preserve these data and information to protect the Nation's investment in observations. These data are critical to our understanding of how the Earth and its many components, including Earth's climate, function and how they change over time. Through our activities, these data are used over and over again in ways we cannot even imagine.

Built on partnerships with national and international scientists, resource managers, industry, and other data centers, the NESDIS data center archives maintain, protect, and ensure the long-term availability of data for current and future generations. These archives contain climatic data, ranging from the post glacial to the latest Global Earth Observation System of Systems (GEOSS) observation; geophysical data, ranging from the Sun to the Earth's seafloor; and oceanographic data, ranging from the late 1700s to yesterday's buoy measurements. Through the active stewardship of these data by the data centers and their national and international partners, we contribute toward understanding how our atmosphere and oceans have changed over time; how climate change is impacting our fisheries; where to find the largest areas of population growth; how to monitor the cyclical nature of the weather in space;

and so forth. These achievements have been possible due to the sustained collaboration of both our partners within and external to NOAA, the Federal government, academia, private industry, state and local governments, and all the people who rely on the data NOAA provides. The following sections describe the products and services available, due to the unique and valuable data NESDIS preserves.

NESDIS National Oceanographic Data Center

The NESDIS National Oceanographic Data Center (NODC) is the entity within the U.S. government that ensures oceanographic data, collected from the coastal tide areas and the deepest parts of the seas, are reviewed for scientific integrity, saved for future use, and made readily understandable, searchable, and accessible. NODC preserves a historical record of the Earth's changing marine environment that is used for operational applications and ocean climate research. NODC's data curation and archiving is a central requirement to ensuring the future quality (e.g., richness and credibility), readability, and usefulness of all types of oceanographic and related ecosystem data. Visitors, ranging from the public and recreational groups to academia and government, come to NODC to receive answers to their questions and information requests. We present the community with access to these clear and concise data in a timely manner, and

NOAA National Oceanographic Data Center
An Ocean of Data and Information...

Mission: To provide scientific stewardship of national and international marine environmental and ecosystem data and information

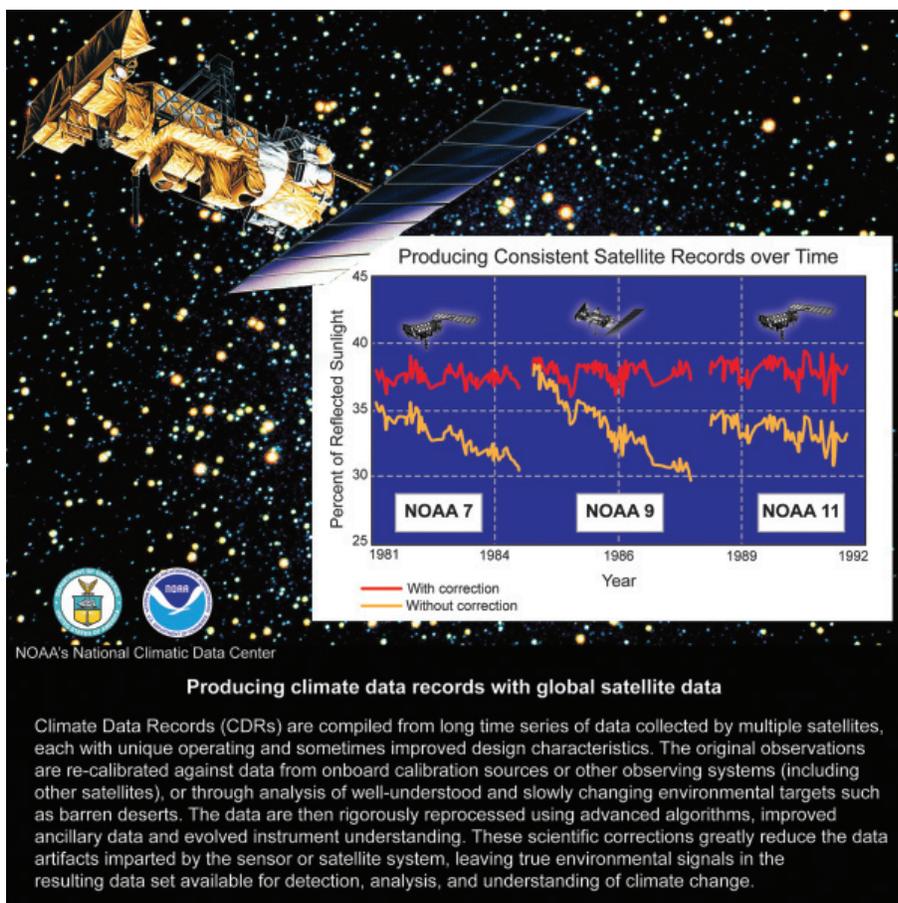
we strive to provide our users with quality information and efficient customer service. NODC has also developed a strategy for displaying and using environmental data in innovative ways. By leveraging new tools to analyze and visualize complex ocean and ecosystem data and information, NODC increases the usability of the data by nonscientific audiences and researchers across the globe.

NESDIS National Climatic Data Center

Accurate and accessible climate data and products form the basis for making decisions that have far reaching economic and political consequences at local, regional, and global levels. Weather and climate sensitive industries, both directly and indirectly, account for about 25 percent, approximately 2.7 trillion dollars, of the Nation's Gross Domestic Product. These industries

include finance, insurance, real estate services, retail and wholesale trade, and manufacturing. The NESDIS National Climatic Data Center (NCDC) is focused on summarizing data into climate products that are distributed and used in assessments by hundreds of thousands of researchers in government, commerce, industry, science, engineering, and national defense.

Decision makers, scientists, and businesses from many professions are able to make more informed assessments and decisions based on these easily accessible and reliable climate data and information. The uses of NOAA's data and information have major impacts on businesses such as agriculture, construction, transportation, energy, and health and human services. For example, climate normals (a useful way to describe the average weather of a location) are one of the most popular products that NOAA



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distributes to users whose operations and planning assessments span several months to multiple years into the future. The energy industry uses climate normals to perform assessments to plan for levels of power usage, to project and compute rate adjustments, research alternate energy sources, model air pollution studies, and project the timing of offshore oil drilling platform construction. The National Renewable Energy Lab and alternative energy companies use historical wind and solar data to plan for the potential usage of wind generators and solar panels. Electric power companies, such as Duke Energy, use heating and cooling degree days normals to model and plan the level of electrical demand. By using NOAA's climate data and products, it has been documented that Duke Energy saves approximately \$2.5 million annually in infrastructure costs for its energy operations.

NESDIS National Geophysical Data Center

The NESDIS National Geophysical Data Center (NGDC) manages over 600 different types of data, ranging from the core of the Earth to the surface of the Sun, from sunspot records dating back to 165 B.C. to the Continuously Operating Reference Stations (CORS)-Global Positioning System (GPS) data being collected as you read this article. As managers of such diverse data, NGDC has become a test bed for effective end-to-end data management in a uniform, standards-based manner. The commitment to data stewardship means more than simply archiving. The goal is to develop common, powerful, yet general data management tools and protocols to standardize operations for all data types. NGDC documents and evaluates its data holdings, providing users with tools to search, sample, and access the data in a useful, user-friendly, and efficient fashion. We are committed to the long-term preservation and productive access to those data for the users of both today and tomorrow.

NGDC stewards the Defense Meteorological Satellite Program (DMSP) Archive, from which the nighttime lights imagery is generated, builds emergency-response power-loss maps, and has quantified global gas flaring. NGDC is the curator for vast amounts of bathymetric data (depth of the seafloor) from which it has generated coastal community-to-global digital elevation models (DEMs), the most detailed of which are critical in modeling and planning for the effects of tsunami and storm-surge coastal flooding. NGDC preserves geomagnetic data, including surface, ocean, airborne, and satellite measurements, as well as models of the main field and its secular change, supporting scientific research, operations, and our online magnetic declination calculator. NGDC houses natural hazards databases describing the occurrence of earthquakes, tsunamis, and volcanoes, which affect large segments of the world population. These data are important for forecasting events, planning response, and mitigation of future occurrences. The information above lists a few examples of how NGDC generates useful products to their vast clientele.

As NESDIS moves forward, our objectives and operations may change, but the underlying goals for the data centers will remain the same: to acquire the Nation's data, provide access to information and resources, and to archive records for the future. Our success relies on the partnerships we make in the future and partnerships we can maintain in the present. We look forward to the new directions that NOAA may go and on working together to accomplish our goals.

Examples of our Products and Services

World Ocean Database, the largest collection of quality controlled *in situ* data, has been cited over 6,000 times in scientific literature.

Ocean Variability and Ocean Heat Content Studies document how oceans are warming or cooling in a changing planet. Plus, our scientists were leading or contributing authors to the Intergovernmental Panel on Climate Change chapters that won a Nobel Peace Prize.

NOAA's Coral Reef Information System illustrates the use of innovative techniques to allow users to search for Coral metadata records in a Google Map application.

Hypoxia Watch 2008 is based on data collected from Southeast Area Monitoring and Assessment Program Groundfish surveys.

Climate Normals, including Heating and Cooling Degree Days, is a product that saves millions of dollars annually and is used in many ways.

Development of U.S. National Air Freezing Index Data Base serves the National Association of Home Builders in savings of \$330 million in construction and energy savings to the homeowner.

Climatic Averages of Winds, Waves, Currents, and Storm Tracks, and Polar-orbiting Operational Environmental Satellite Data are used by all major marine shipping companies for planning optimal shipping routes to expedite the commerce of cargo.

Surface Hourly Weather Reports, Upper Air Reports, and Weather Radar are used by the Federal Aviation Administration in planning for optimal orientation of airport runways.

Historical Hurricane Products, Wind and Rainfall Return Periods, and Next Generation Weather Radar Products are used by the Federal Emergency Management Agency in planning of evacuation routes and disaster relief scenario strategies.

Snowfall Climate Normals are used by major U.S. City Governments in planning annual budgets for snowfall removal.

Nighttime Lights are used by the World Bank and Emergency Response Agencies to map power outages and report on quantity of global gas flaring.

Hazards Database is used by insurance companies in the generation of actuarial tables.

New NOAA “What to Archive” Procedure Developed

Pete Steurer, Operations Planning Officer, National Climatic Data Center

A universal procedure has been developed to determine what scientific records are preserved in a NOAA archive. The *NOAA Procedure for Scientific Records Appraisal and Archive Approval* document, which was released in December 2008, outlines the new four-step process. The process involves identification, appraisal, approval, and implementation, which are depicted in the accompanying graphic below. NOAA now has a corporate methodology to determine what data are preserved in NOAA archives as opposed to the *ad hoc* methods that had existed at the NOAA data centers and numerous NOAA centers of data across the U.S.

NOAA’s Data Management Committee assigned a team in December 2007, comprised of data management experts

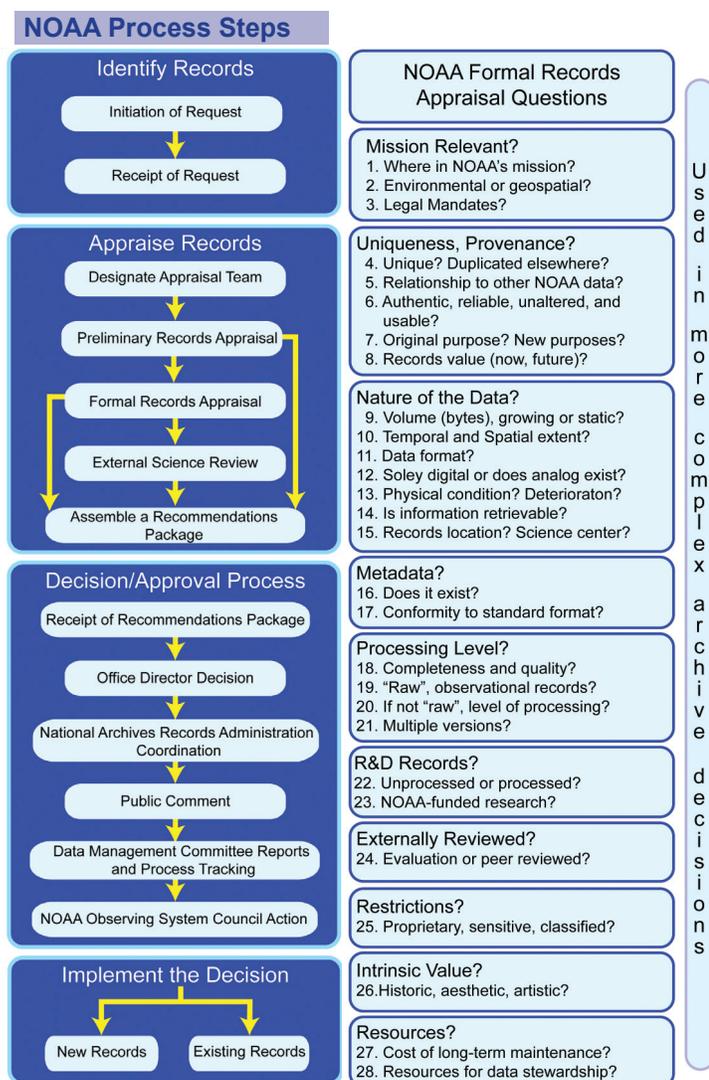
across all NOAA Line Offices and Goals, to develop the new “what to archive” procedure. The development involved an extensive literature review of past work in this area, coordinating reviewer comments from inside and outside NOAA, and presentations at various forums. The procedure was unveiled in June 2008 at a joint workshop of NOAA data managers and the NOAA Science Advisory Board’s Data Archive and Access Requirements Working Group (DAARWG). DAARWG commended NOAA on the procedure and recommended that the final document—*NOAA Procedure for Scientific Records Appraisal and Archive Approval*—be produced.

The new procedure allows for expeditious decisions regarding scientific records that are known to be within the scope of the NOAA mission and also allows for a lengthier, more formal appraisal process for complex archive requests. To guide the formal appraisal process, NOAA created a Scientific Records Appraisal Criteria Questionnaire (see the graphic to the left). The NOAA team developed the questionnaire based upon guidelines from the National Archives and Records Administration, from National Research Council reports on NOAA data management, and from a review of existing appraisal techniques for scientific records.

The new procedure ensures that decisions about NOAA scientific records preservation are made with the direct involvement of the scientists who handle those data. In addition, the procedure allows for a higher level NOAA approval authority when requested or required. When formal appraisals are conducted or when records are to be removed from a NOAA archive, a mechanism has been incorporated into the procedure to acquire input from external NOAA scientists as well as to allow public comments on the decisions NOAA makes as a result of this procedure. Public input is an important component in determining what scientific records are preserved in NOAA archives.

Two versions of the procedure have been produced—*Guide for Data Users and Producers* and *Guide for Data Managers*. The *Guide for Data Users and Producers* is a four-page brochure intended to give an overview of the procedure. The *Guide for Data Managers* describes in detail the step-by-step process that data managers will use to determine which scientific records are preserved in NOAA’s archives. ■

These two documents are available at <http://www.nosc.noaa.gov/docs/products.html> under the Policy and Procedures section.



NOAA's New Climate Data Record Project

Jeffrey L. Privette, CDR Project Manager; John Bates, Chief, Remote Sensing and Applications Division; Thomas Karl, Director; and Ed Kearns, Deputy Chief, Remote Sensing and Applications Division; National Climatic Data Center, and David Markham, CDR Project Deputy Manager, Scientific Research Corporation

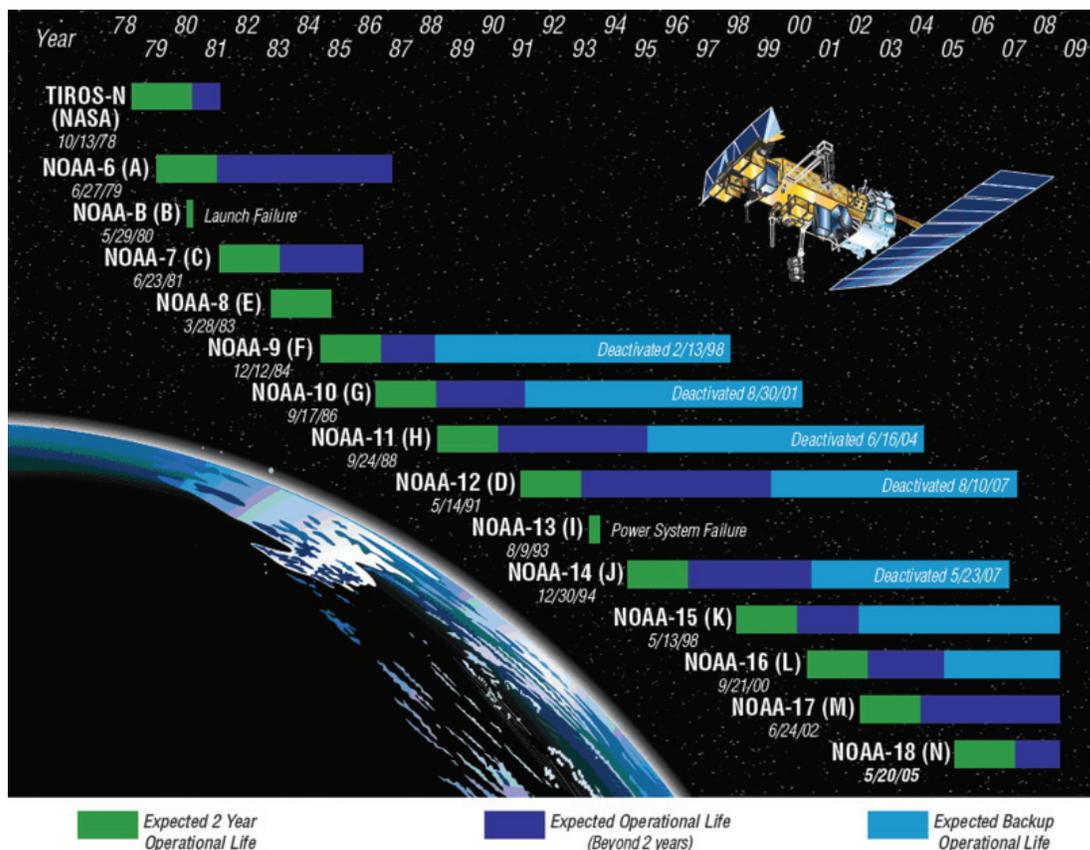
The challenges of detecting, understanding, and projecting the impacts of climate change require high-quality global data collected consistently over decades. In the nearly 50 years of meteorological satellite observations, the data have increasingly been used to complement research satellite data for climate studies. However, absent today's heightened concerns about climate change, many of the early research and meteorological satellites were either not designed for climate-quality measurements or were not succeeded at the end of their lifetimes. The resulting patchwork of quality data has required extraordinary scientific effort to yield credible climate information, which is why the Climate Data Record (CDR) Project is so important.

As part of its climate mandate, NOAA has a responsibility to provide the Nation with objective data and tools to help it characterize, understand, predict, mitigate, and adapt to climate change and variability. Therefore, in responding to a White House request to assess impacts of the 2006 restructuring of the National Polar-orbiting Operational Environmental Satellite System (NPOESS), NOAA, the National Aeronautics and Space Administration (NASA), and the United States Geological Survey (USGS) championed the need for the systematic and sustained provision of satellite CDRs and Climate Information Records (CIRs). The National Research Council (NRC) defines a CDR as "a time series of measurements of sufficient length, consistency, and continuity to determine climate variability and change." CIRs are created from CDRs and provide specific information about environmental phenomena of particular importance to science and society (e.g., trends in Arctic sea ice extent).

Although several satellite programs, including NPOESS, the Polar-orbiting Operational Environmental Satellite (POES), and the Defense Meteorological Satellite Program (DMSP), provide rapidly-produced weather and hazard products (so-called Environmental Data Records), climate change studies typically require decades-long records that are scientifically reprocessed using more rigorous algorithms, evolved instrument knowledge, and data from many satellites. Indeed, major scientific and policy organizations (e.g., Global Climate Observing System [GCOS], NRC, the Intergovernmental Panel on Climate Change [IPCC], and the U.S. Climate Change Science Program [CCSP]) have independently articulated the need for authoritative CDRs.

The President's fiscal year (FY) 2009 budget dedicated funding for NOAA's CDR efforts. NOAA's National Climatic Data Center initiated the CDR Project to lead NOAA's CDR activities and to coordinate with partner agencies.

(continued on page 7)



▲ Three decades of data from NOAA's POES are critical to many CDRs and CIRs, however, the varying degradation rates of instruments and orbits provide challenges in developing climate-quality time series.

New Solutions for Navigating an Ocean of Data

Sharon Mesick, Program Manager and Chairperson of the Integrated Product Team for Exploration Information Management, National Coastal Data Development Center; and Susan Gottfried, Exploration Data Project Manager, General Dynamics Information Technology

Special thanks to Dr. Steve Hammond, OER Chief Scientist, and Angela Sallis, NCCDD Outreach Coordinator, for helping with this article.

The past several decades have brought significant changes to physical, chemical, and biological ocean environments. With more than 90 percent of the world's ocean still unmapped and unexplored, the need for exploration has never been more critical. NOAA's Office of Ocean Exploration and Research (OER) provides NOAA and the Nation with a unique capability to discover and investigate new ocean areas and phenomena and to conduct the basic research required to capitalize on discoveries. The sound scientific data and information-rich products resulting from OER's Exploration Program activities address the fact that we know so little about the living and nonliving resources that exist in the ocean, and how the ocean is changing in response to changing global environments. The OER Vision is to "make the unknown ocean known" and to inspire in others an interest and desire to understand more.

To delve into the mysteries of the world's ocean, OER sponsors interdisciplinary expeditions in collaboration with scientists around the globe. In 2008, NOAA commissioned the *Okeanos Explorer*, the Nation's first vessel dedicated to systematically exploring the ocean. Once fully operational, the *Okeanos Explorer* will apply state-of-the-art technology to meet NOAA's exploration mission requirements. OER expeditions typically last several weeks, and each expedition may explore multiple scientific objectives. While underway, each expedition compiles a large and diverse collection of scientific data, gathered from a variety of sensors and systems in a range of formats and media. Collection methods and processing steps must be fully documented and coupled with datasets in a preservation archive. Data and information products must be broadly accessible, while also protecting access to sensitive ocean resources and respecting varying timelines for data release. Further, the compiled expedition collection of scientific datasets and information products must be managed holistically to realize the full return on the investment in exploration. These complex and sometimes conflicting objectives present a unique data management challenge.

To meet this challenge, the ocean exploration staff joined with NOAA's Data Centers and other partners to form an Integrated Product Team (IPT) for Ocean Exploration Data Management in 2003. The team is implementing an "End-to-End" Data Management Plan to manage the scientific information from collection through archive and to ensure broad accessibility. The plan streamlines and automates expedition planning and operational processes, producing standard docu-

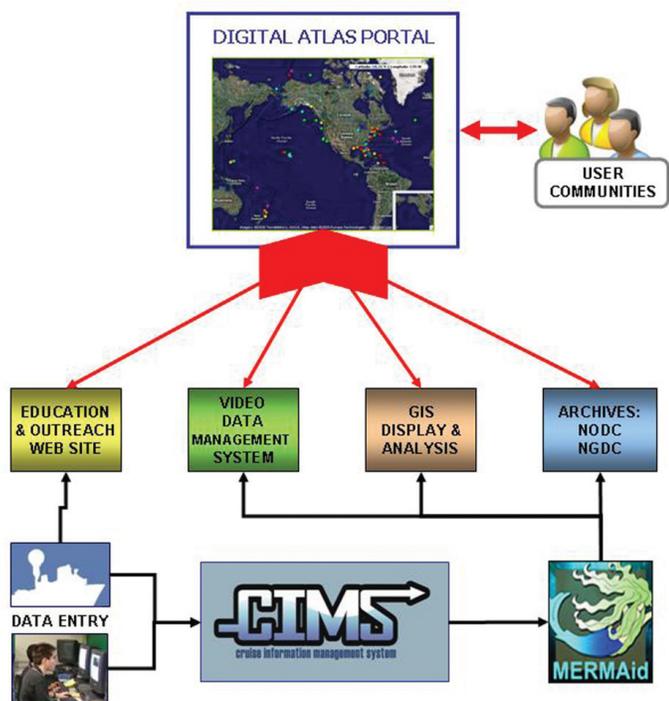
mentation files; adapts existing tools whenever feasible; uses open source standards for maximum efficiency and transparency; and sustains the collaboration between NOAA's Data Centers and OER's Exploration Program to draw on those pools of expertise and resources.

Standardized documentation, or metadata, forms the common thread that connects individual management steps into an end-to-end process. A metadata record is a file of information that captures basic data characteristics; metadata records are the key elements that enable the public to discover and access information. The Federal Geographic Data Committee (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM) is mandated for use in documenting Federal geospatial data collections; this standard was adapted by the team to tie individual datasets together into compiled expedition collections.

Creating detailed and accurate metadata can be a time-consuming process. Team members developed the Cruise Information Management System (CIMS), a software tool that automates metadata creation by aggregating information from each process step. CIMS forms the cornerstone of the End-to-End Plan. The CIMS user interface replaces handwritten data entry logs and spreadsheets with a digital data entry screen. As exploration data managers enter information into CIMS, key documentation is saved into the corresponding CSDGM metadata element, resulting in CIMS documentation files in the CSDGM format.

The CIMS/CSDGM documentation files are interoperable with the Metadata Enterprise Resource Management Aid (MERMAid), a freely available, versatile metadata management tool that allows CSDGM metadata records to be published to public data discovery portals, such as the Geospatial One Stop (GOS). CIMS-produced metadata records are also bundled with scientific information for archival at NOAA Data Centers. MERMAid allows authorized data managers to transform CSDGM records to other metadata formats and to export records as eXtensible Markup Language (XML) files, maximizing resource investment in creating standard documentation.

The End-to-End Plan also catalogs the vast amounts of video data collected during many expeditions. The team developed a customized adaptation of the Library of Congress MACHine-Readable Cataloging (MARC) metadata format to address gaps in video data documentation standards. MERMAid allows the CIMS/CSDGM file to be transformed to the



customized MARC format, ensuring standardization across the collection and aiding in data discovery. The Video Data Management System (VDMS) was developed to provide wide discovery and access to exploration videos, images, and compiled expedition collections.

To ensure broad discovery and access to compiled expedition collections, the Digital Atlas Portal was developed. This portal’s easy-to-navigate Google Map displays expedition locations on a global map. Each mapped location leads users to the unique, expedition-specific collection of data, information, and outreach materials. Users may directly access and download scientific data from distributed repositories, includ-

ing NOAA archives, NOAA Library catalogs, and geospatial databases. Customized online Geographic Information System (GIS) tools visually integrate exploration data with other geospatial datasets. Additional expedition collections are readily added as they become available and soon will include scientific information from upcoming voyages on the *Okeanos Explorer*.

The team continues to evolve data management planning in step with the new sensor suites and technical capacity available aboard the *Okeanos Explorer*. Working in collaboration with NOAA’s Office of Marine and Aviation Operations, CIMS is being adapted to read files generated by the shipboard Scientific Computing System (SCS). SCS information is mapped into CSDGM elements. The goal is to automate the creation of CSDGM metadata records for a myriad of shipboard sensors with a minimum of human intervention. Other technical investigations include the transformation of shipboard sensor data collections to standard, OpenSource formats to enable automated archival and timely access and investigation into the use of a shore side Data Assembly Center, which could provide a common environment for data transformation and distribution.

The team’s approach to end-to-end data management, emphasizing flexibility, adaptation, and transparency, remains on course to meet future ocean exploration and information management needs. The team is ensuring scientific information resulting from OER’s global, interdisciplinary explorations is broadly accessible to decision makers, scientists, educators, and the public, continuing to inform the Nation’s priorities and NOAA’s future missions. ■

For more information, visit www.explore.noaa.gov.

(New Climate Data Record Project continued from page 5) Given that early algorithm development is supported elsewhere (e.g., NOAA’s Center for Satellite Applications and Research and NASA’s Earth Observing System), the CDR Project is focused on the generalization and application of mature algorithms to multiple satellites and sensors which together span climate-relevant time periods. The Project is designed for sustained implementation, such that mature CDRs can be subjected to further improvements crafted through parallel research programs as new measurements and observing systems come online.

The project sets its CDR priorities according to major environmental phenomena and is currently funding an initial set of Fundamental Climate Data Records (FCDRs) and lower complexity Thematic Climate Data Records (TCDRs). Based on NRC distinctions, FCDRs are calibrated and quality-controlled, long-term sensor data records that

have been improved over time, and TCDRs are geophysical variables, such as sea surface temperature, that are derived from FCDRs. In 2009, the Project is focused on CDRs that contribute to an understanding of Earth’s water and energy cycles.

To ensure its CDRs are scientifically-defensible, traceable, and transparent, Project developments will be open to public inspection and scrutiny, as well as independent generation of repeatable results. Products and supporting information, including source codes, will be available through NOAA Data Center(s) for public accessibility, preservation, and stewardship.

The CDR Project expects to execute its responsibilities in partnership with the larger scientific community through annual NOAA Announcements of Opportunity—open to academic, commercial, nonprofit, and government proposers—as well as through community reviews and working groups. ■

News Briefs

NOAA Launched New Polar-orbiting Satellite for Climate and Weather

A new NOAA polar-orbiting environmental satellite, launched on February 6, 2009, is supporting NOAA's weather and ocean forecasts, including long-range climate predictions for El Niño and La Niña, and supporting U.S. search and rescue operations. The new spacecraft—NOAA-N Prime—lifted off from Vandenberg Air Force Base in California.



▲ NOAA-N Prime launched from Vandenberg Air Force Base

“There is a growing demand for reliable coverage and accurate data from satellites to help us understand what’s happening in the environment,” said Mary E. Kicza, Assistant Administrator for NOAA’s Satellite and Information Service. “This spacecraft will help meet those requirements.”

As an example, Ms. Kicza cited the Advanced Data Collection System (ADCS) onboard the satellite that will relay meteorological and oceanographic data—even track migration patterns of wildlife—to help researchers improve their study of Earth’s environment. It’s the first time ADCS will be flown on a NOAA satellite.

When NOAA-N Prime reached orbit, it was designated NOAA-19, the latest in the series of NOAA polar-orbiting environmental satellites that have served the Nation. NOAA-19 is circling the globe in an afternoon orbit, capturing valuable environmental data that will help support NOAA’s long-range seasonal outlooks.

“NOAA-N Prime data will help us monitor current conditions in the atmosphere and oceans and keep tabs on long-term climate trends,” said Wayne Higgins, Director of NOAA’s Climate Prediction Center. “These data are increasingly important in polar regions, given the potential effects of a warming climate on the polar ice cap and sea ice extent.”

NOAA is working closely with the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) to ensure seamless satellite coverage. Under an agreement, each of NOAA’s two operational polar-orbiting satellites—NOAA-18 and NOAA-19—is carrying a EUMETSAT instrument. In return, through 2020, EUMETSAT is carrying key NOAA instruments on board its European-built Metop satellites, which fly in morning orbits.

Additionally, NOAA-19 is part of the international Search and Rescue Satellite-Aided Tracking (SARSAT) system. NOAA satellites are able to quickly detect distress signals from emergency beacons and have supported more than 6,000 rescues in the United States and its surrounding waters since 1982.

NOAA manages the Polar-orbiting Operational Environmental Satellite

(POES) program and establishes requirements, provides all funding, and distributes environmental satellite data for the United States. The National Aeronautics and Space Administration’s (NASA’s) Goddard Space Flight Center procures and manages the development and launch of NOAA polar-orbiting satellites on a cost reimbursable basis. Twenty-one days after the launch of NOAA-N Prime, NASA will transfer operational control of the satellite to NOAA. NASA’s comprehensive on-orbit verification period likely will last up to 45 days after the launch.

For more information about NOAA-N Prime, visit http://www.osd.noaa.gov/POES/noaa_n_prime.htm.

NOAA: Jason-2 Satellite Data Now Available to Scientists

On December 16, 2008, NOAA announced that scientists around the world now have access to valuable data from a new international satellite, the Jason-2/Ocean Surface Topography Mission (OSTM). This information allows them to closely watch the rate of global sea-level rise and monitor changing ocean features around tropical cyclones.



▲ Jason-2 Satellite

Jason-2/OSTM, launched June 20, 2008, is a joint effort between NOAA, the National Aeronautics and Space Administration (NASA), France’s Centre National d’Etudes Spatiales (CNES), and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT). After five months of calibration and validation activities, an international team of scientists, including representatives from NOAA, declared the near-real-time Jason-2 data were ready for public distribution.

“The sea level is rising at a rate of 3.2 mm/year, nearly twice as fast as the previous 100 years,” said Laury Miller, Chief of NOAA’s Laboratory for Satellite Altimetry. “If this rate continues unchanged during the coming decades, it will have a huge impact on coastal regions, with erosion and flooding. We need the Jason-2 data to help us monitor what’s happening.” The spacecraft is flying in a low Earth orbit and monitoring 95 percent of the world’s ice-free oceans every 10 days. Jason-2/OSTM is extending the climate data record by providing a long-term survey of Earth’s oceans, tracking ocean circulation patterns, and measuring sea-surface heights and the rate of sea-level rise. These are critical factors in understanding climate change.

Along with detecting climate change factors, Jason-2/OSTM is being used to forecast short-term, severe weather events, including tropical cyclones. NOAA will use the altimeter measurements to map the ocean heat content—the fuel that feeds a storm’s intensity—along the storm’s predicted track.

NOAA, working with CNES, is providing ground system support for this mission. This includes: commanding the satellite, downloading all the data, and distributing the information to weather and climate forecasters who are monitoring ocean-born storms and phenomena such as El Niño/La Niña and global sea-level rise.

NOAA Satellite Conference Helps Users Prepare for Future

Weather and climate forecasters, emergency managers, and other users of NOAA satellite information met with top NOAA officials in Miami December 8-12, 2008, to learn more about new equipment and software that will be needed to retrieve data from the next generation of NOAA satellites. Representatives from more than 20 countries in the Western Hemisphere and international organizations, including the World Meteorological Organization, were invited.

At the conference, NOAA experts focused on helping users change the data-receiving technology they are using for the current geostationary and polar-orbiting satellites to fit the advanced technology of the Geostationary Operational Environmental Satellite Series R (GOES-R) and the National Polar-orbiting Operational Environmental Satellite System (NPOESS).

“Data from NOAA satellites are critical to understanding weather and our changing climate here and around the world,” said Mary M. Glackin,

Deputy Under Secretary for Oceans and Atmosphere. “We have to help prepare the satellite data users to receive these improved data, without missing a beat.”

NOAA satellite data are available to direct readout users throughout the world and support a wide range of meteorological, oceanographic, terrestrial, and solar activities. Users will have to modify or replace current receiving equipment and basic software as the next generation of NOAA satellites is launched.



▲ GOES full disk infrared view on December 2, 2008.



▲ GOES color enhanced infrared view on December 2, 2008.

Fishing for a New Data Framework: A New Data Management Approach for the National Marine Fisheries Service

Laura Oremland, Marine Biologist, NOAA Fisheries Office of Science and Technology

NOAA's National Marine Fisheries Service (NOAA Fisheries) is dedicated to the stewardship of living marine resources (e.g., fish, invertebrates, marine mammals) and the marine ecosystems upon which they depend. As a steward, NOAA Fisheries conserves, protects, and manages living marine resources in a manner that ensures their continuation as functioning components of marine ecosystems, affords economic opportunities, and enhances the quality of life for the American public.

Data and information are the foundation for all of the NMFS's work to meet its mission. The data are extensive in terms of both quantity and content and run the gamut from commercial fisheries landings and biological data of organisms (e.g., age, growth rates) to information on fishing communities. These can be in a variety of formats, including traditional databases, photographs, and even sonar images and sound recordings. User communities for NMFS data are extensive, ranging from scientists, to students, to policy makers, and the public.

Given the size and rapid accumulation rate of NMFS data, data management has become a pressing issue. Most

people have little time or patience to spend weeding through files or being passed from person-to-person to obtain the information they need. For example, the graduate student looking for data to support her research does not want to spend time calling multiple people to locate and download the correct dataset. Likewise, the fisherman trying to make a living and support his family can become frustrated weeding through red tape to find the latest data on management measures for his fishery.

In order to satisfy increasing demands for user access to the vast array of NMFS' valuable information assets, the data must be cataloged and maintained in an easily accessible format. Descriptive information for each existing dataset (metadata) must also be cataloged so users can easily search for data of interest and understand how to use it. In addition, quality controls must be implemented to clarify for users the reliability of the datasets. The ultimate goal is to provide a web portal similar in format to that of Amazon.com, but which will allow users to easily search for datasets rather than books.

Organizing and establishing such a web-based data portal would be a large undertaking and may even require a change in NMFS culture for successful implementation. The NMFS Office of Science and Technology recently established the Fisheries Information Management Committee (FIMC) to assess the nature of NMFS data management challenges and to provide recommendations for addressing them. As one of its first tasks, FIMC surveyed NMFS leadership in both headquarters and field offices to identify and prioritize NMFS data and information needs. Several key issues were identified. Most notable were the lack of an NMFS-wide data catalog with corresponding metadata, and the challenges facing NMFS data quality and consistency.

To help address the NMFS's data and information challenges, FIMC will: 1) Establish a single Authoritative Agency Data Catalog with corresponding metadata; and 2) Develop data quality plans for the largest NMFS data assets. Meeting these objectives will produce an easy-to-use NMFS web portal, with the intent being that a few clicks of the mouse will take the user to their NMFS data of interest.

The vision of FIMC is that "NMFS customers can confidently find, access, and use our data." With an energetic staff across NMFS led by Jim Sargent, the Chief Information Architect, this vision is well on its way to becoming a reality. ■



▲ A haddock swimming over starfish preying on sea scallops in the Northeast Region. The smaller fish below the haddock is a red hake.

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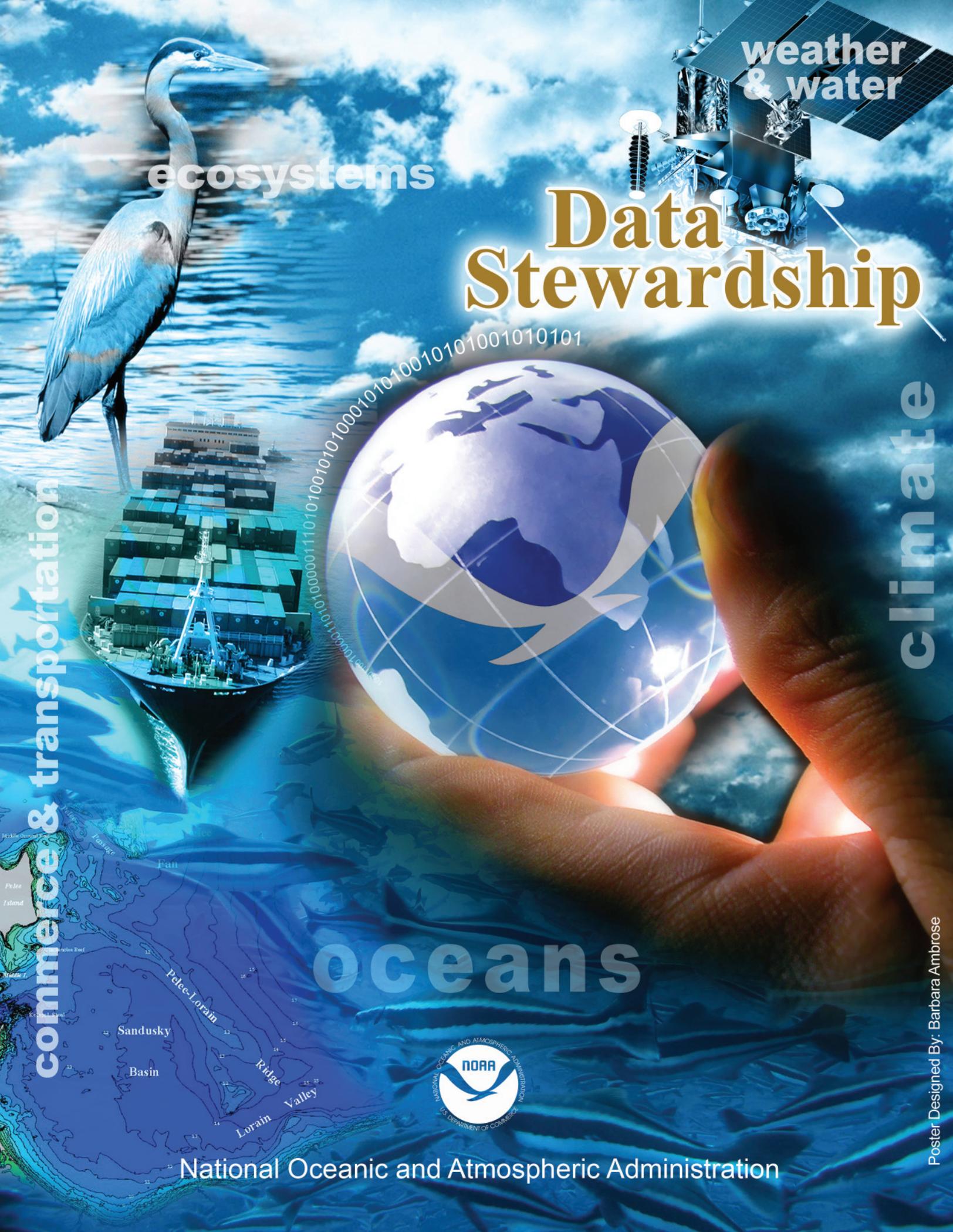
Data Stewardship

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Poster Designed By: Barbara Ambrose

Sharing the Planet, Sharing the Data

Angela Sallis, Outreach Coordinator, National Coastal Data Development Center

Patrick Caldwell is the Pacific Islands Liaison for the National Oceanographic Data Center (NODC)/National Coastal Data Development Center and the manager of the Joint Archive for Sea Level and the Joint Archive for Shipboard Acoustic Doppler Current Profiler Data. From his University of Hawaii office, Pat interacts with agencies from Thailand to Brazil to Spain, supporting NOAA's international archive and collaborations. Below he discusses the importance of international data stewardship:

- Q:** You receive oceanographic data, such as sea level and current velocity, from all corners of the world each week. How do you find these data sources?
- A:** Many countries participate in large scale umbrella scientific data organizations such as the United Nations Educational, Scientific and Cultural Organization's Intergovernmental Oceanographic Commission. Having been in the field for over twenty years helps because I have established contacts in the various agencies; when I ask for data, it has a more personal touch.
- Q:** What do you think motivates countries to contribute data?
- A:** I believe countries participate in data sharing because they want to be good neighbors. They know the collected data can be used for many mutually beneficial applications such as the creation of more accurate navigational charts or better weather and climate forecasting tools.
- Q:** What happens to the international data?
- A:** The data are collected at world data centers, such as the World Data Center for Oceanography at NODC, for long-term storage and dissemination. All countries have free access to the data and can use the information to explore and understand the global environment through applications such as the World Ocean Atlas. ■