EARTH SYSTEM MONITOR

A guide to NOAA's data and information services

Vol. 19, No. 1 May 2012

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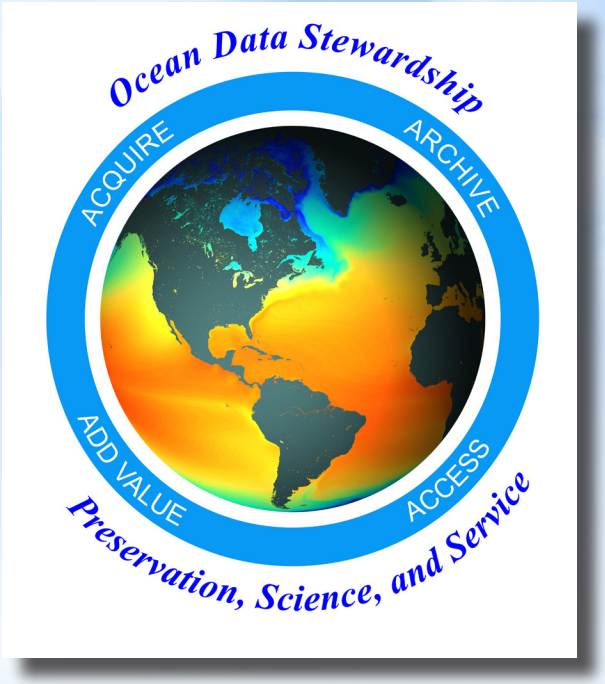
U.S. Department of Commerce
National Oceanic and Atmospheric Administration

Providing Scientific Stewardship of Marine Data and Information



Have you ever performed a Google search on "ocean data" or "ocean temperatures"? NODC comes up first! Hundreds of thousands of people use NOAA's ocean data for research, coastal planning, business actions, commerce and transportation, or beach travel plans.

NODC Provides...

- The World's largest collection of freely available oceanographic data
- Water temperatures dating back to the late 1700's and measuring tens of thousands of meters deep
- A "State of the Ocean Climate" from NODC's Ocean Climate Lab and Satellite Team's scientific analyses
- Scientific journals, rare books, historical photo collections and maps through the NOAA Central Library, a division of NODC
- Data management expertise including metadata training through NODC's National Coastal Data Development Center

Experience Matters

For over fifty years, NODC has served the oceanographic community and the public with unmatched expertise. These experts, made up of a unique blend of ocean scientists, data managers and librarians, know that good decisions are based on good data. By acquiring ocean data from all over the world and from a variety of sources, NODC provides services and products that decision makers and researchers need. Behind the advancing technology are people who understand that oceanographic research and observational data collected for the public's benefit, must be archived, protected, and made available to everyone. NODC is a key component of NOAA's mission. After all, today's data is the foundation for tomorrow's decisions. ■

From the NODC Director

Margarita Conkright Gregg, Ph.D.

I want to welcome our readers to our new digital version of the Earth System Monitor (ESM). It gives me great pride to highlight a few of the products and services generated by NODC for the ocean community. I also want to express my deep gratitude to our staff. They possess a passion to make sure the next generation of users will find novel ways to use the data that this current generation has invested so much in.

In this issue, you will read how NODC is supporting NOAA's Ocean Acidification (OA) Program by providing online data discovery and long-term archival for a diverse range of OA data. This activity illustrates our continuing effort to build a collaborative relationship among scientists, data managers, and NODC staff towards the stewardship of ocean data. Contributing to the success of these efforts is our Geoportal server, which will bring together NODC's various data access, visualization, discovery services, and metadata into a user-focused framework.

Regionally, our popular Gulf of Mexico (GoM) Data Atlas is moving into year two, and is building exponentially on its original philosophy of leveraging resources among agencies. Building on the baseline Atlas generated by NOAA's National Ocean Service in 1985, the digital GoM Data Atlas has 95 map plates in 31 different subject areas with data from all five Gulf States.

Globally, NODC continues to quantify world ocean heat content variability. Based on all of the historical and modern ocean temperature profile data archived at NODC, the Ocean Climate Laboratory has shown how ocean heat content has increased, and accounts for approximately 90 percent of the increase in Earth's climate system since 1955.

In our role as the U.S. archive for oceanographic data, we provide near real-time distribution and long-term data stewardship for the Ocean Surface Topography Mission (OSTM)/Jason-2 products. These products show changes in sea surface height. In this issue, we provide examples of how sea surface height changed as a result of the March 11, 2011 earthquake near northeastern Japan and the large magnitude of wave height variations associated with Hurricane Irene, from August 21-28, 2011.

In our role as the NOAA archive for information, we are developing a Deepwater Horizon Institutional Repository in collaboration with the National Technical Information Service (NTIS) and the NOAA Chief Information Office. The Repository takes a limited set of publicly-cleared documents, videos, photos, and maps that deal with the Deepwater Horizon event and makes them available in digital form. In the future the NOAA Central Library will include legacy NOAA documents and provide a single point of access to this information in digital form.

Finally, NODC launched its Facebook page in October 2011. Since then, we have continued to increase our popularity by communicating to the public our wealth of great resources. Please continue to provide us your feedback so we can better serve the ocean community we are so connected and dedicated to. ■

Margarita

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www.nodc.noaa.gov/ESM

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

Ocean Climate Data Records at NOAA

Deirdre A. Byrne, Satellite Oceanography Team, NODC; Eric W. Leuliette, Remko Scharroo, John L. Lillibridge, NOAA Laboratory for Satellite Altimetry

NOAA's mission includes a mandate to "understand climate variability and change to enhance society's ability to plan and respond" (NRC, 2004). At the National Oceanographic Data Center (NODC), we apply our in-house expertise to create high quality and consistent time series of sufficient duration to allow the detection of climate change, and in addition, collaborate with other groups to help the ocean climate community produce datasets that will meet the rigorous standards required to become an official NOAA Climate Data Record. A premier example of the application of in-house expertise is NODC's Global Ocean Heat and Salt Content time series discussed on page 4 of this issue. In this article, we profile two other projects that illustrate a collaborative approach.

A climate data record is defined as a time series of measurements of sufficient length, consistency, and continuity to determine climate variability and change (NRC, 2004). To ensure NOAA's climate records are scientifically defensible and able to be independently verified, they must contain repeatable results and be able to be independently generated. This requirement sets a high bar for the documentation of the scientific algorithms and computer code used to create climate records. To maximize the societal benefit, climate records must also be accessible to and understandable by the widest audience possible.

NOAA's first official Ocean Climate Data Record is the Advanced Very High Resolution Radiometer (AVHRR) Pathfinder Sea Surface Temperature (SST) data set (http://pathfinder.nodc.noaa.gov). It is produced operationally at NODC in collaboration with Prof. Robert Evans at the University of Miami. Pathfinder is a calibrated, high-resolution, 30-year time series with global coverage. "SST is a critically important environmental parameter, a primary determinant of heat transfer rates between the ocean and atmosphere and a major driver of marine ecosystem dynamics. It is used in climate monitoring, understanding climate impacts on marine organisms, and a wide range of other applications", said Kenneth S. Casey, the NOAA project leader. Pathfinder begins with low-level data collected by NOAA's Polar-orbiting Operational Environmental Satellites (POES). Using mature and well-understood algorithms, the data are transformed from raw measures of radiance into SST. Pathfinder SSTs are calibrated against a global network of moored and drifting buoys that measure water temperature directly. In creating the first version of the

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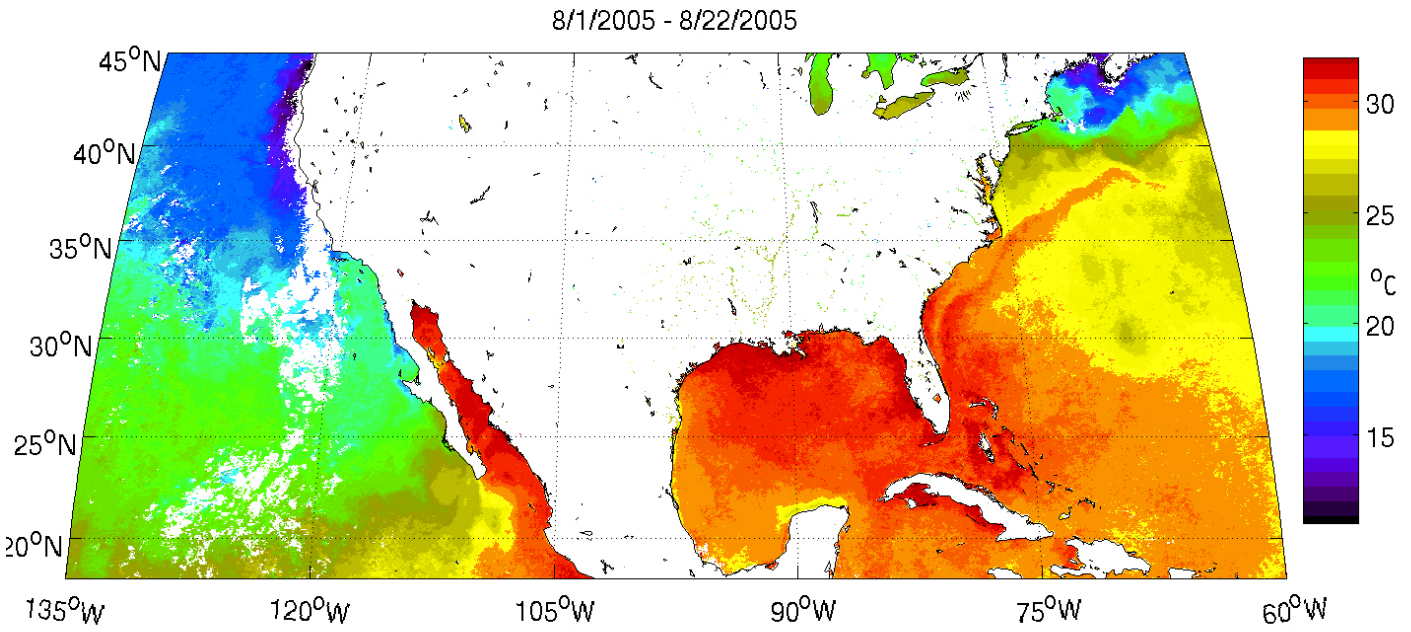


Figure 1: Average Pathfinder SST (in degrees C) for the 3 week period preceding Hurricane Katrina's entry into the Gulf of Mexico. Hurricanes are fueled by the heat in the upper ocean.

Ocean Heat and Salt Content

Sydney Levitus, Chief, Ocean Climate Laboratory; John Antonov, Oceanographer, Ocean Climate Laboratory; Tim Boyer, Oceanographer, Ocean Climate Laboratory

As the predominant feature of the planet, the ocean plays a major role in the Earth's climate system. Ocean waters can absorb or lose heat at the surface of the ocean, be transported to subsurface depths, move laterally and then return to the surface years, decades, or even centuries later where they would possibly affect future climate. Understanding the changes in the ocean's heat content is a key to improving our ability to understand, assess and adapt to a changing planet.

The first task necessary to quantify ocean heat content variability was to develop a database of ocean temperature profiles. The National Oceanographic Data Center (NODC) and its collocated World Data Center (WDC) for Oceanography, Silver Spring, have been developing such databases for several decades. Under the aegis of the International Oceanographic Data and Information Exchange (IODE) committee of the Intergovernmental Oceanographic Commission (IOC), projects were commenced in the 1990s to enhance acquisition of as much historical and modern ocean temperature profile data as possible. These projects were the "Global Oceanographic Data Archaeology and Rescue" project to gather pre-1991 data, and the "World Ocean Database" project to gather post-1991data. In addition, Ship-of-Opportunity projects in 1969 started gathering modern data using Expendable Bathythermograph (XBT) instruments (probes dropped from a ship that measure the water temperature as they fall). Beginning around 2005, the Argo project's system of profiling floats began making available profiles of temperature and salinity on a near-global basis down to approximately 2000 meters (6,000 feet) every ten days.

Based on all of the historical and modern ocean temperature profile data archived at NODC, the NODC Ocean Climate Laboratory has published four papers quantifying world ocean heat content variability. Ocean heat content has increased since 1955 in a near-linear fashion and accounts for approximately 90 percent of the increase in Earth's climate system since 1955. The next two largest terms in earth's heat balance for this period are the increases in the heat content of the continents (lithosphere) and the atmosphere. However the increase in heat content is much smaller in these two components of Earth's climate system as compared to the world ocean. These published works on ocean heat content have stimulated much data analysis and research internationally. Much of this work has led to (or is leading to) improvements in quality of the archive of ocean temperature profiles. Monitoring of a climate observing system needs to be continuous to ensure that systematic biases do not enter the observing system. Figure 1 shows NODC's most recent time series of ocean heat content for the 0-700 m, 0-2000 m, and 700-2000m layers of the world ocean.

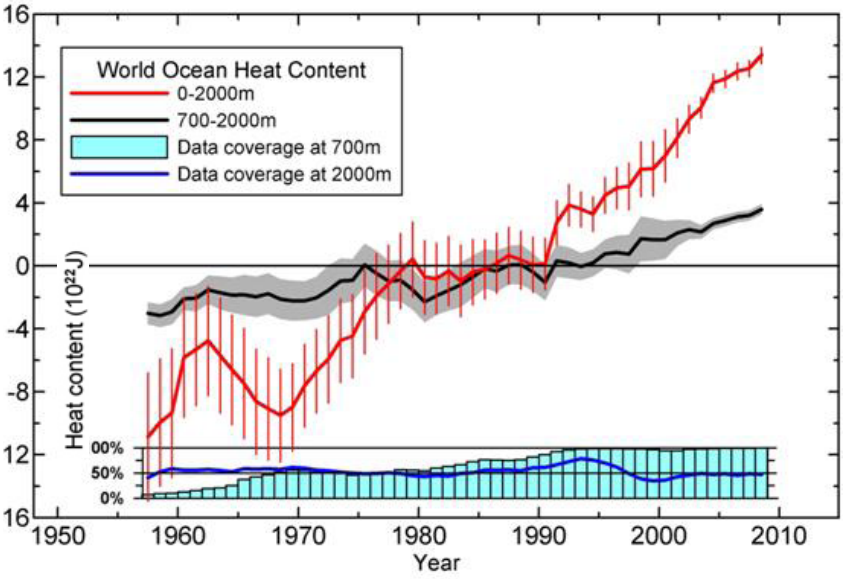


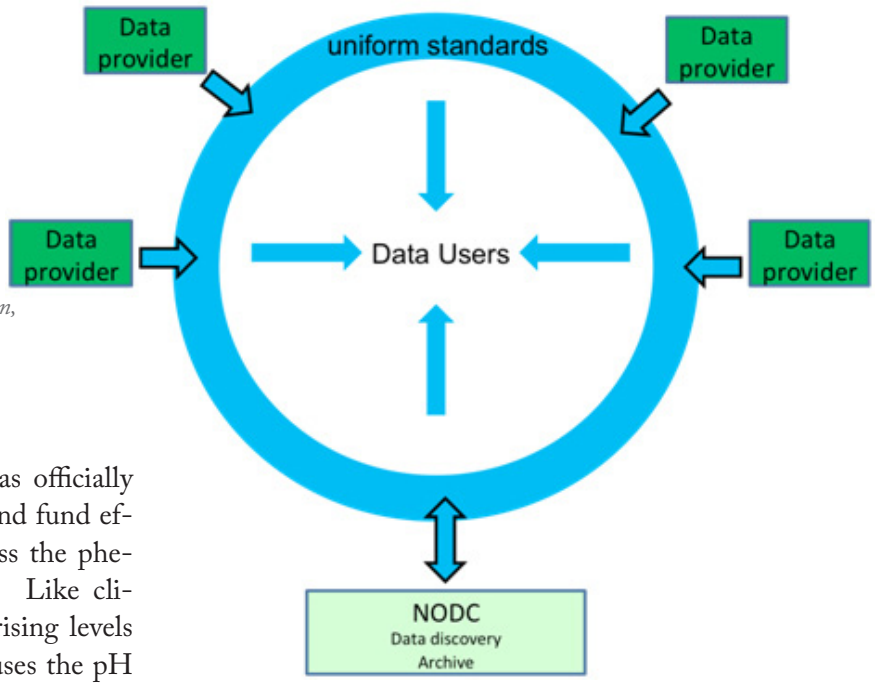
Figure 1: Time series for the World Ocean of ocean heat content (10^{22}J-) for the 0-2000 m (red) and 700-2000 m (black) layers based on running pentadal (five-year) analyses. Each pentadal estimate is plotted at the midpoint of the 5-year period. The vertical bars represent +/- 2.*Standard errors (S.E.) about each pentadal estimate for the 0-2000 m estimates and the grey-shaded area represent +/- 2.*S.E. about each pentadal estimate for the 0-700 m estimates. The blue bar chart at the bottom represents the percent contribution of the 700-2000 m layer to the 0-2000 m layer for each pentad. Reference period is 1955-2006.

The NODC Ocean Climate Laboratory identified large-scale changes in the salinity of the world ocean for the 1955-2006 time period. High salinity regions, such as the subtropics, have become saltier and relatively low salinity regions, such as the subarctic, have become fresher. Several scientific groups have confirmed these results and have linked them to an increase in earth's hydrological cycle due to increasing greenhouse gases in Earth's atmosphere since the Industrial Revolution began.

All of the data on which the ocean heat content analyses are based, as well as the ocean heat and salt content products, are available at www.nodc.noaa.gov. ■

Towards an Ocean Acidification Data Stewardship System

Krisa Arzayus, Chief, Marine Data Stewardship Division, NODC; Hernan E. Garcia, PhD, Chemical Oceanographer, NODC; Steve Hankin, Computer Scientist, NOAA Pacific Marine Environmental Laboratory; Elizabeth Jewett, Director, NOAA Ocean Acidification Program; Roy Mendelssohn, Supervisory Operations Research Analyst, NOAA Southwest Fisheries Science Center



The NOAA Ocean Acidification Program was officially established in May 2011 in order to integrate and fund efforts across and external to NOAA that address the phenomenon known as ocean acidification (OA). Like climate change, ocean acidification is caused by rising levels of carbon dioxide in the atmosphere, which causes the pH of the world oceans to decrease as they continue to absorb approximately 25% of all anthropogenic carbon (i.e., carbon derived from human activity; Sabine et al., 2004). The decrease in pH is also leading to a decrease in saturation state of certain carbonate minerals important for shell formation in some marine organisms, meaning that the shells of some organisms may have a higher risk of dissolving in these more acidic waters. The OA program has organized monitoring, research and outreach activities along six themes: 1) characterizing the carbon chemistry of the US coastal and open ocean waters through a variety of fixed and underway observing systems, 2) evaluating the impacts on ecosystems with an emphasis on commercially important species, 3) modeling the ecological and socioeconomic impacts of changes in the biogeochemistry in order to provide future projections to policymakers for decision making purposes, 4) developing an integrated data management structure to facilitate the sharing of data both within and beyond the NOAA OA Program, 5) engaging with the public, policy makers, industry and international community in order to share our results and to educate about the scientific basis for and implications of potential changes in the ocean's chemistry, and 6) developing adaptation strategies where possible.

To support NOAA's Ocean Acidification Program and the scientific community, the National Oceanographic Data Center (NODC) will serve as the NOAA OA data management focal point by providing online data discovery, access to NODC-hosted and distributed data sources, and long-term archival for a diverse range of OA data. This effort seeks to build a collaborative relationship with shared responsibilities among scientists, data managers, and NODC staff towards the implementation of an OA data stewardship system (OADS).

Detailed metadata that describes the OA data, including characterizations of data quality, is recognized as a pillar of OADS. OADS will leverage NODC's scientific data stewardship and standard web services, including a new Geoportal discovery tool and other services that facilitate machine-to-machine data discovery and on the fly visualization. Coordinated data flow both to and from OADS with data providers and partner data assembly centers will ensure that audiences will always have access to authoritative versions of the data, regardless of where they are accessing the data. OADS will preserve OA data, ensuring access to original datasets as well as subsequent versions, for this and future generations of data users. The data management and scientific communities are actively engaged in this effort and NODC is excited to play a key role in supporting this National priority. ■

Christopher L. Sabine, Richard A. Feely, Nicolas Gruber, K. L. Robert M. Key, John L. Bullister, Rik Wanninkhof et al. (2004). "The Oceanic Sink for Anthropogenic CO2." Science 305

NODC's Geoportal: an Integration Tool for Interoperable Data Services

Kenneth S. Casey, Ph.D., Technical Director, National Oceanographic Data Center; Yuanjie Li, Science Data Analyst, ERT Inc.

The US National Oceanographic Data Center (NODC) launched a new Geoportal Server (http://data.nodc.noaa.gov/geoportal) in October 2011, addressing the need to bring order and clarity to NODC's wide range of interoperable data and services.

NODC has implemented numerous interoperable data technologies in recent years to enhance the discovery, understanding, and use of the vast quantities of oceanographic data in the NODC archives. Combined, these technologies enable NODC to provide access to its data holdings and products through most of the commonly-used standardized Web services (Table 1). Additionally, NODC maintains several ad hoc services like World Ocean Database Select and the Shipboard Sensor Database. Since not all services can be applied to all of the tens of thousands of collections in the NODC archive, confusion can arise for the users trying to figure out the available services for different collections. The Geoportal Server addresses this concern and is used as an integrating technology, bringing together NODC's various data access, visualization, discovery services, and metadata into a user-focused framework.

Table 1

- Open-source Project for a Network Data Access Protocol (OPeNDAP) Hyrax server
- Unidata's Thematic Realtime Environmental Distributed Data Services (THREDDS) Data Server (TDS)
- NOAA's Live Access Server (LAS)
- Environmental Systems Research Institute's (ESRI) ArcGIS Server
- Open Geospatial Consortium suite of services:
  - Web Mapping Service (WMS)
  - Web Coverage Service (WCS)
- Catalog Service for the Web (CS/W)
- OpenSearch

While providing an enhanced web-based interface for more integrated human-to-machine discovery and access, the Geoportal Server also enables NODC for the first time to support a robust set of machine-to-machine discovery services. Scientific users, and others, can not only come to the NODC Geoportal Server, but they can search it directly from their own client applications. Users will find archived data sets and products, along with all of the available interoperable access, simple processing, reformatting, and visualization services available for their search results.

The Geoportal Server's intuitive interface provides a consistent look and feel for ocean data discovery. Figure 1 shows the Web interface of the Geoportal Server's search and browse pages. Users can type keywords in the search bar, or define the time period and spatial criteria on the search page (Figure 1a). The browse page provides another search option by clicking on the corresponding keywords from the browse tree (Figure 1b). Both search interfaces return the list of results with links to metadata, multiple data servers, and available data-preview thumbnails and functions.

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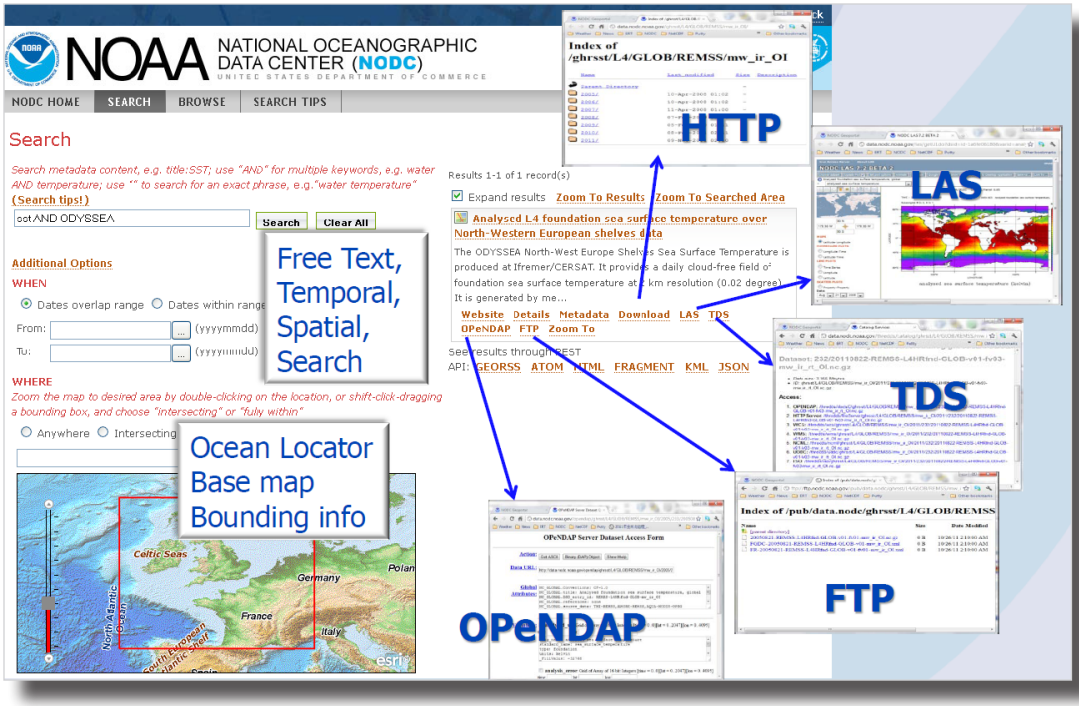

Figure 1a: NODC Geoportal Server Search Page

Application of the Ocean Surface Topography Mission/JASON-2 Satellite in Monitoring of Disasters: Hurricane and Tsunami Events

Yongsheng Zhang, Remote Sensing Scientist, NODC-ERT Inc; Yuanjie Li, Science Data Analyst, NODC-ERT Inc; Kenneth Casey, Technical Director, NODC; Deirdre Byrne, Satellite Oceanography Team Leader, NODC.

NODC's Satellite Oceanography team provides scientific stewardship of satellite derived oceanographic datasets and analyses. Since 1986, the altimetry satellite missions have provided global observations of sea surface heights for studying ocean circulation, climate change and sea-level rise. Satellite altimeters are instruments that measure a range (distance), which is converted very precisely to a height above mean sea level.

The Ocean Surface Topography Mission (OSTM)/JASON-2 is a follow-on mission continuing the previous TOPEX/ Poseidon and Jason-1 satellite missions to ensure continuity of high quality measurements for ocean science. Compared to other NOAA satellites, Jason-2 is designed uniquely to observe the sea surface height anomaly (SSHA) and significant wave height (SWH) of the ocean surface. Therefore, it can be applied in real-time monitoring of changes of the sea surface across tsunami waves and the wave activities around a hurricane. Using Environmental Systems Research Institute's (ESRI)'s Geographic Information System (ArcGIS) software, the National Oceanographic Data Center (NODC) has developed high-quality visualizations of the original data from Jason-2. This article will describe two examples of how they can be successfully used in mapping, as well as providing valuable information in disaster management support.

While Hurricane Irene was intensifying, the Jason-2 satellite passed near and over its center four times. Figure 1 presents the large magnitude of wave height variations and locations associated with Hurricane Irene while it progressed along the U.S. Atlantic coastline from August 21-28, 2011.

The March 11, 2011 earthquake near the east coast of Honshu, Japan, generated a devastating tsunami that could be observed over the Pacific Ocean. Figure 2 shows the Jason-2 observed sea surface height anomaly (shown by color shading) overlaid onto a map showing the travel time of the tsunami, produced by NOAA's National Geophysical Data

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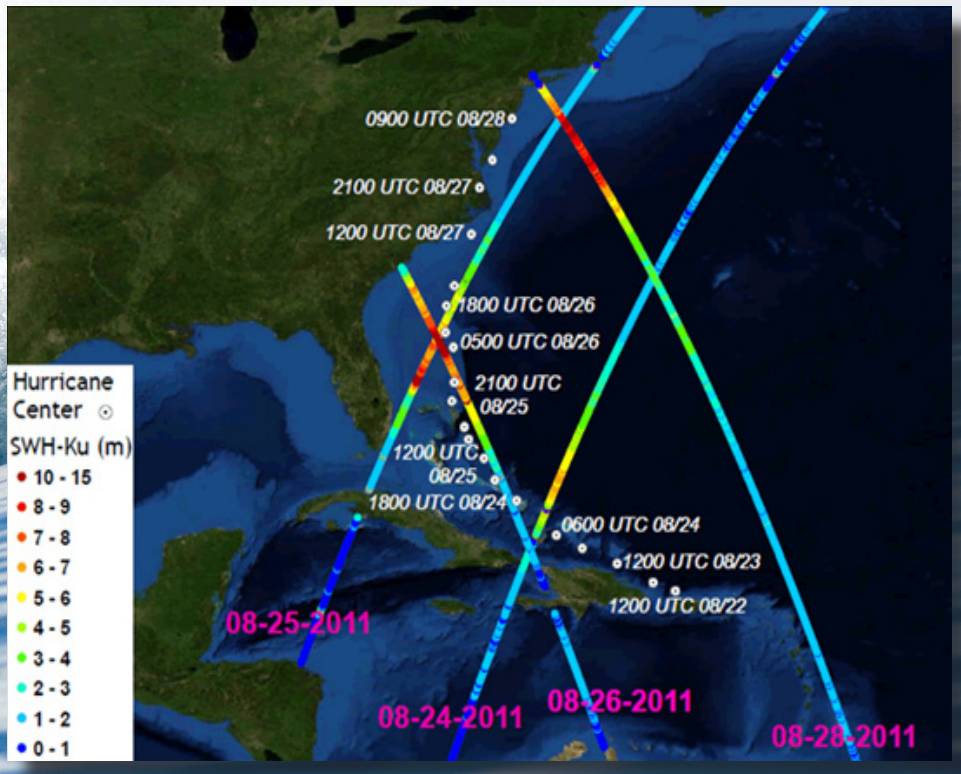
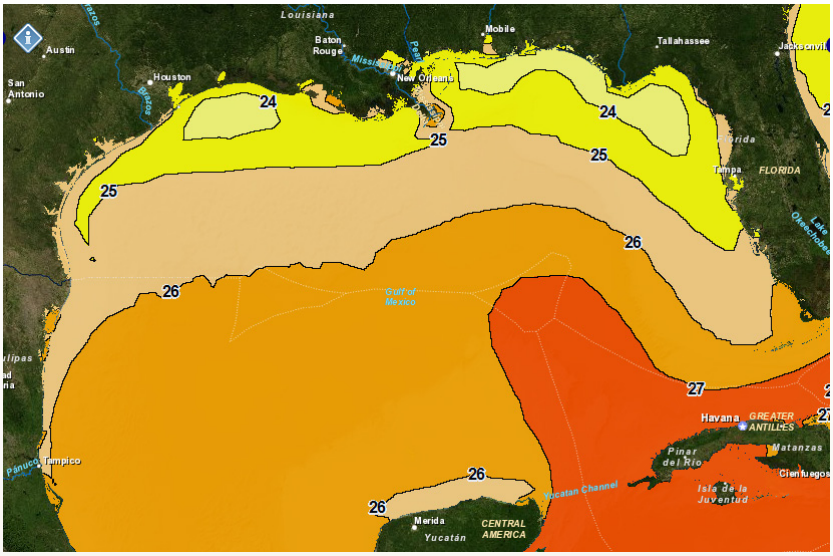


Figure 1. Jason-2 observed significant wave height (color shading) associated with Hurricane Irene during late August, 2011. The data used to generate the graphic is the Jason-2 Operation Geophysical Data Records (OGDR), which are near-real-time records delivered every 3-5 hours.

Next Generation Gulf of Mexico Data Atlas Accessible to All

Angela Sallis, Outreach Coordinator, NODC's National Coastal Data Development Center

For the first time in 25 years, a new Gulf of Mexico Data Atlas is (http://gulfatlas.noaa.gov) available online by the National Oceanic and Atmospheric Administration (NOAA). The next generation Gulf of Mexico Data Atlas provides answers to questions related to the physical environment, marine resources, and economic activity in the Gulf of Mexico. Hosted by NOAA's National Coastal Data Development Center (NCDDC), a division of the National Oceanographic Data Center (NODC), the atlas currently has 95 map plates in 31 different subject areas with more planned for 2012.



Part of the Gulf of Mexico Data Atlas, this map shows remotely-sensed sea surface temperature (SST) averages for January through March. Sea surface temperature is a critical environmental parameter and an important indicator of climate change. The 4.6-km resolution sea surface temperatures used in the atlas were created jointly by NOAA's National Oceanographic Data Center (NODC) and the University of Miami's Rosenstiel School of Marine and Atmospheric Science (RSMAS) as part of the Advanced Very High Resolution Radiometer Pathfinder Program.

The Gulf of Mexico Data Atlas is a sequel of sorts to the printed "Gulf of Mexico Coastal and Ocean Zones Strategic Assessment Data Atlas" which was published by NOAA's National Ocean Service in 1985. After the Gulf disasters of recent years, many state and federal agencies turned to the very large, hardbound book as a source of information about multiple aspects of the Gulf of Mexico. As restoration of the Gulf progressed, it became clear it was time to revise the data and information in this useful reference. The new Atlas updates and expands the 1985 publication in an online format which is available to everyone.

"We wanted to create something that would be valuable to a wide range of users," Dr. Margarita Gregg, Director of NODC said. "The Gulf of Mexico Data Atlas is easy to use and has levels of information that makes it useful to everyone from the student to the scientist."

So what exactly is in the Gulf of Mexico Data Atlas? The Atlas has data from all five Gulf States. Maps are available in six topic areas: Physical (e.g., bathymetry, climatology), Biotic (chemosynthetic communities, aquatic vegetation), Living Marine Resources (oysters, shrimp, grouper), Economic Activity (shipping & navigation, oil & gas), Environmental Quality (Deepwater Horizon monitoring), and Jurisdictions (marine, fishery closures). Each map has a narrative explaining why the topic is important and how the data was gathered. Users can link directly to the data and to a high resolution image of the original 1985 map, if available. Many different agencies and organizations provided the data that make up the Atlas. "Though published by NOAA, the Gulf of Mexico Data Atlas is truly a collaborative effort," said Russell Beard, Director of NCDDC. "The Atlas has data from federal, state, non-governmental agencies, and academia. We also had representatives from a cross section of those data providers on the Gulf of Mexico Data Atlas Prototype Executive Steering Committee who provided guidance on the maps and the supplementary information."

The Gulf of Mexico Data Atlas will expand with new data to improve the spatial and temporal understanding of the Gulf of Mexico. Ongoing partnerships among data providers via a collaborative network are a vital component of the Atlas. In January 2011, a Gulf Data Atlas Workshop was held at Grand Bay National Estuarine Reserve to assess user needs and requirements related to its development. A second workshop was held in February 2012, and work has already begun to expand the scope of the atlas. If you are a collector/provider of Gulf of Mexico data observations and would like to become an active partner or contribute data in 2012, please contact ncddc.data_atlas@noaa.gov. ■

New Resource for Information from the NOAA Library

Stanley Elswick, NOAA Central Library

The NOAA Central Library, a division of NOAA's National Oceanographic Data Center, has created a new information resource available to NOAA and the public—the Deepwater Horizon Institutional Repository. The Repository takes a limited set of publicly-cleared documents, videos, photos, and maps that deal with the Deepwater Horizon event and makes them available in digital form. Currently the Repository provides access to over 2000 digital objects associated in some way with the Deepwater Horizon event. These digital resources come mostly from NOAA, but also include documents from the Environmental Protection Agency, the Coast Guard, academic partners, and other sources. The Repository continues to grow as the Library receives and adds more resources to the directory.

The Repository features a quick search option that searches all indexed fields found in the Repository metadata. Users can make focused searches by using individual indexes available on the Advanced Search tab, such as title, creator or creating organization, subject headings and others. Users can make further refinements to any search by limiting their search to specific subject headings or report-year found in the results.

In addition to using metadata to build the Repository database, the NOAA Central Library's metadata staff contributes these same records to WorldCat, a shared database that reflects the holdings of over 50,000 libraries worldwide, and to NOAALINC, the shared catalog of 28 NOAA libraries. By sharing these records, it gives increased exposure and allows a larger audience to discover these resources.

The Repository is the result of a partnership between The NOAA Central Library, the Office of the Chief Information Officer (OCIO) of NOAA and the National Technical Information Service (NTIS). NOAA and NTIS signed an interagency agreement and began Phase I of the project in the summer of 2011. A team consisting of representatives from each of the parties met weekly to manage the development and launch of the Repository, which occurred in October 2011. Phase 2 of the Repository project began in March 2012 and will extend the capabilities of the system. Development will focus on providing additional index entries for users to find items of interest, improving workflow and compiling usage statistics. Phase 2 will also look to ingest objects from other topical areas other than strictly the Deepwater Horizon Oil Spill event. Currently, only a portion of the digital objects actually reside at NTIS. Eventually, most of the Repository contents will actually be stored there, freeing up storage space on NOAA servers.

Ultimately, the NOAA Central Library will extend the reach of the Repository to include legacy NOAA documents that have been converted into digital format, and newly-created digital documents. This expanded NOAA Institutional Repository will archive and provide a single point for NOAA and the greater public to find NOAA intellectual output in digital form. Parties interested in finding out more about the Repository can contact either Neal Kaske (Neal.Kaske@noaa.gov) or Stanley Elswick (Stanley.Elswick@noaa.gov). To see the Repository, go to noaa.ntis.gov. ■

(Satellite Monitoring continued from page 7)

Center (NGDC). A sharp rise in sea level in the southwestern Pacific Ocean at 02:03 PM March 11th is a result of the arrival of the tsunami wave 8 hours and 17 minutes after the earthquake.

In its role as the U.S. archive for oceanographic data, the NODC provides near real-time distribution and long-term data stewardship for the OSTM/Jason-2 products. NODC has established various points of access to these data, known as Geophysical Data Records (GDRs) (http://www.nodc.noaa.gov/SatelliteData/Jason2/). NODC is also implementing a quality monitoring system known as the Rich Inventory, which routinely tracks data quality and makes the results available to public users. The near real-time Jason-2 satellite data plays an important role in monitoring the earth, especially in light of recent natural disasters and the effect they have on the ocean surface. ■

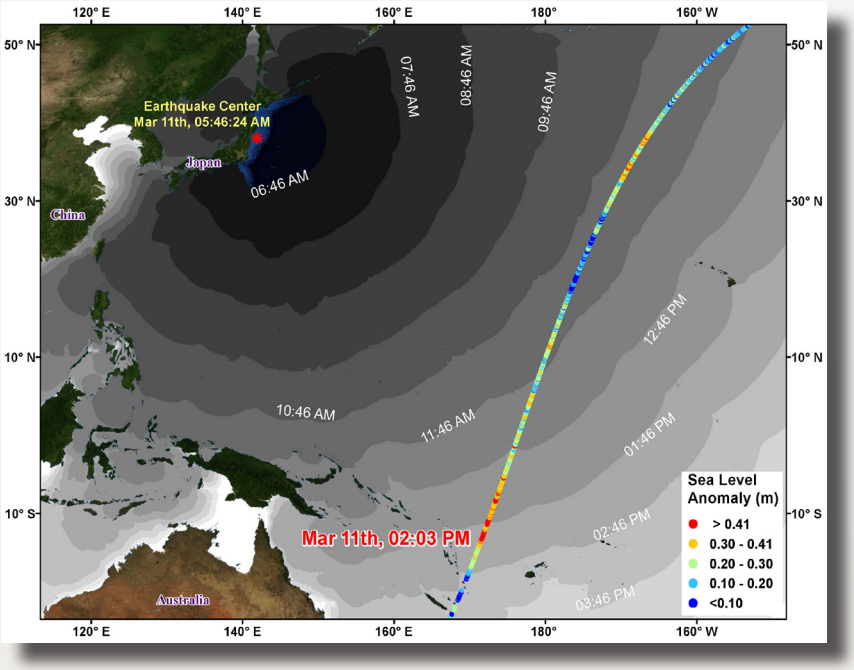


Figure 2: Sea surface height anomaly observed by Jason-2 satellite (color shading) overlaid onto a map (black-white shading to show time) which indicates the first-arrival times of the tsunami after the earthquake. The data used to generate the graphic are Jason-2 final GDRs.

(Geoportal server continued from page 6)

Usability tests were conducted at recent meetings shortly after the release of the server. Positive feedback such as, "Easy to use", "This is a great server", and "Very helpful" dominated the responses. Suggestions on future improvements were also collected. The successful experience of launching NODC's Geoportal server was shared with other NOAA Data Centers, as well as external data communities. Over the course of the coming year, many improvements will be made to the existing NODC Geoportal, and feedback will be collected continuously to help ensure the system meets user needs and expectations. ■

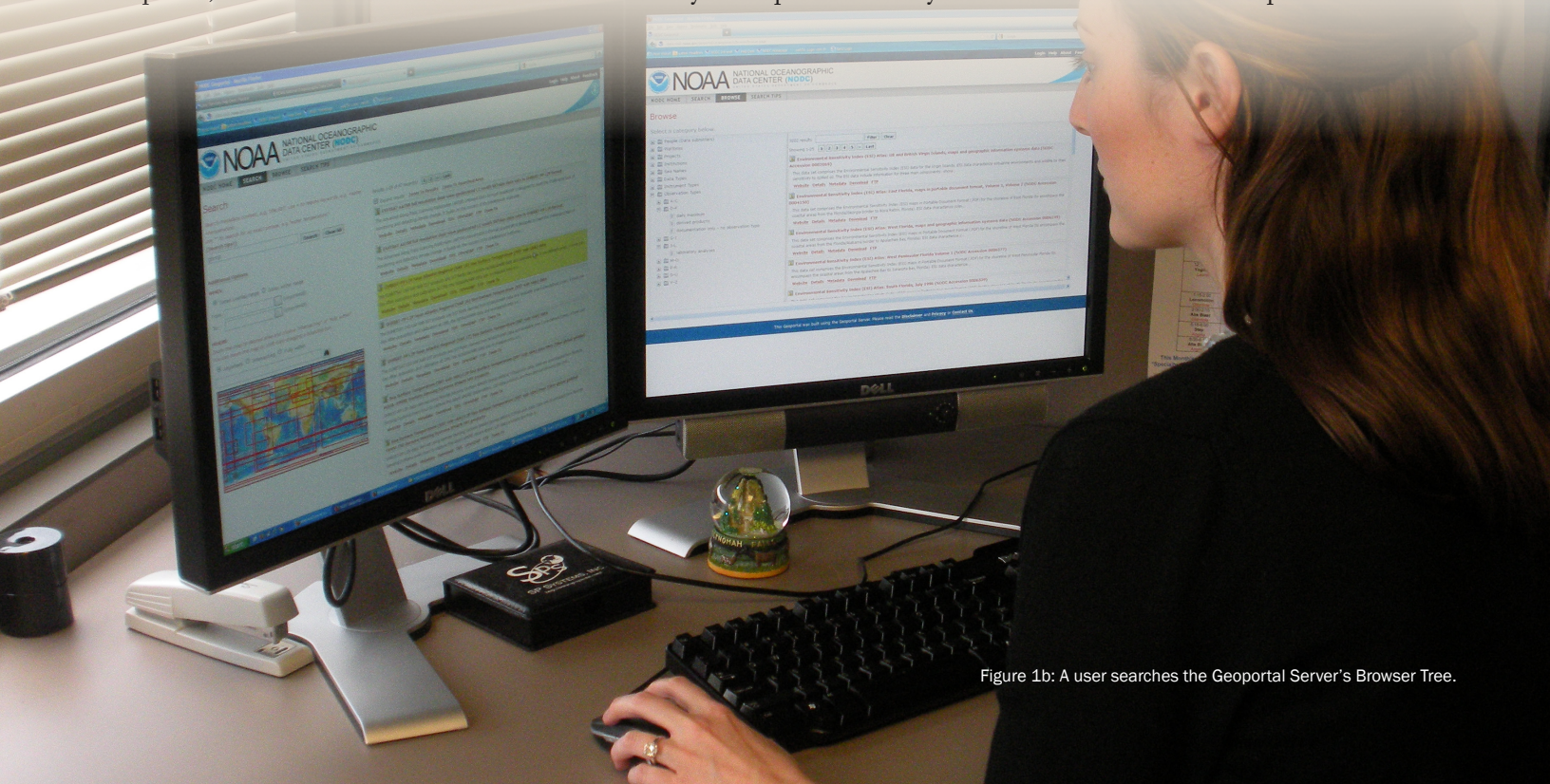


Figure 1b: A user searches the Geoportal Server's Browser Tree.

(Data records continued from page 3)

Pathfinder Ocean CDR, staff at the NODC gained valuable experience in meeting the format, documentation, and other standards of a NOAA Climate Data Record. While University of Miami researchers continue to refine and improve the algorithms used in Pathfinder, NODC has focused on ramping up its systematic production capability, providing robust data access, and on developing derived information products that help assess societal impact. Some examples are long-term temperature trends needed by fisheries managers, and temperature anomalies used in coral mortality studies.

By the year 2100, sea level rise is conservatively anticipated to affect the livelihoods and homes of 108-145 million people who live at an altitude of 1 meter above sea level or less (Rowley et al., 2007; Anthoff et al., 2006). NODC's second prototype Ocean CDR is a trio of sea level records created by researchers Eric Leuliette and Remko Scharroo at NOAA's Laboratory for Satellite Altimetry (LSA) in collaboration with Prof. Gary Mitchum at the University of South Florida. The first of these is the sea level anomaly at observed (along-track) locations. The remaining two products, based on the first one, are a global mean sea level rise time series and regional sea level trends at a 1°x1° horizontal resolution (Fig.2). These NOAA products are distinguished from all other altimetric satellite Climate Data Records now in production, in that they incorporate data from all of the missions that have flown to date, providing increased geographic coverage and resolution of regional trends. In the near future, this trio will be produced in Climate and Forecast (CF)-compliant NetCDF format, documented, supported by robust metadata, archived at NODC and made accessible to the community. ■

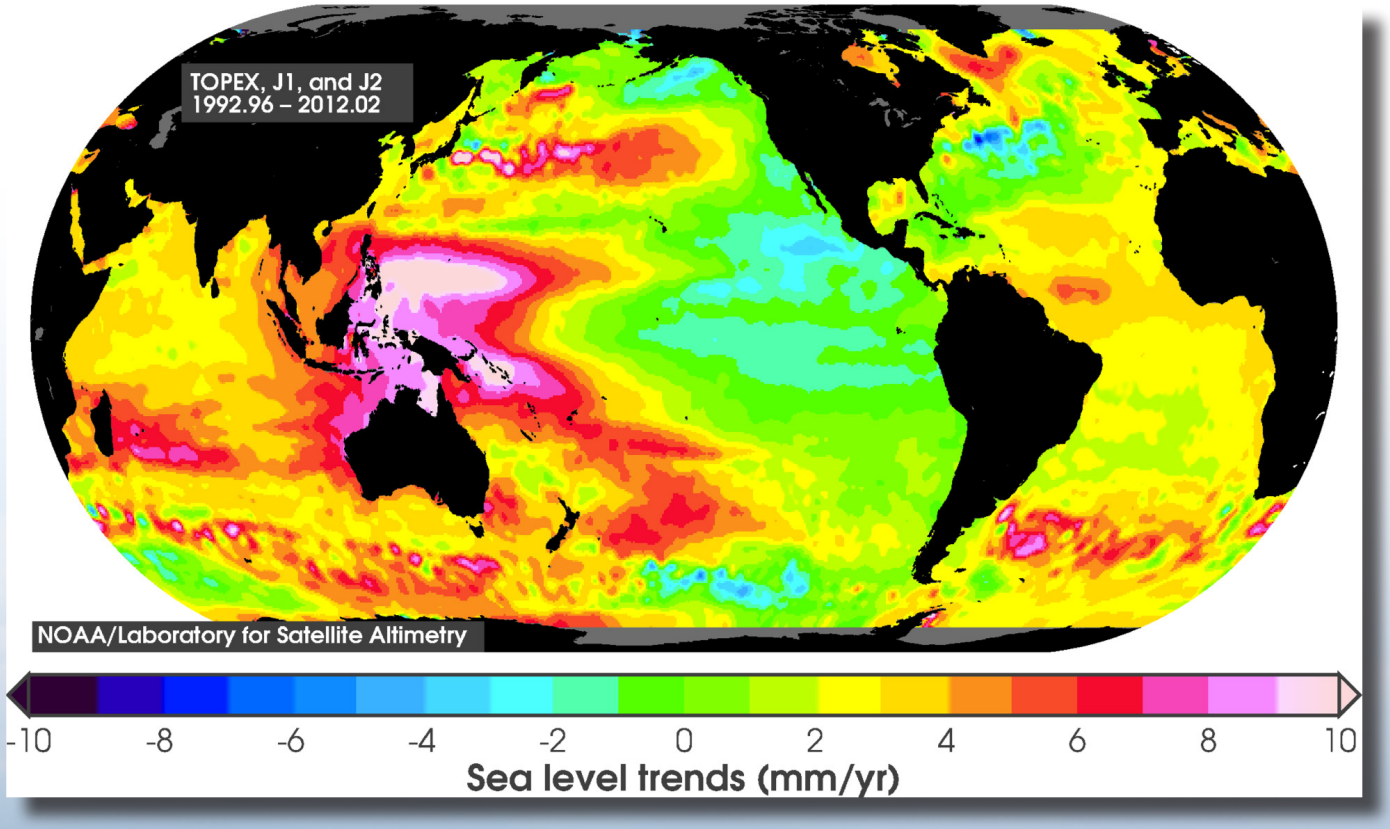


Figure 2: Linear trends in regional sea level rise.

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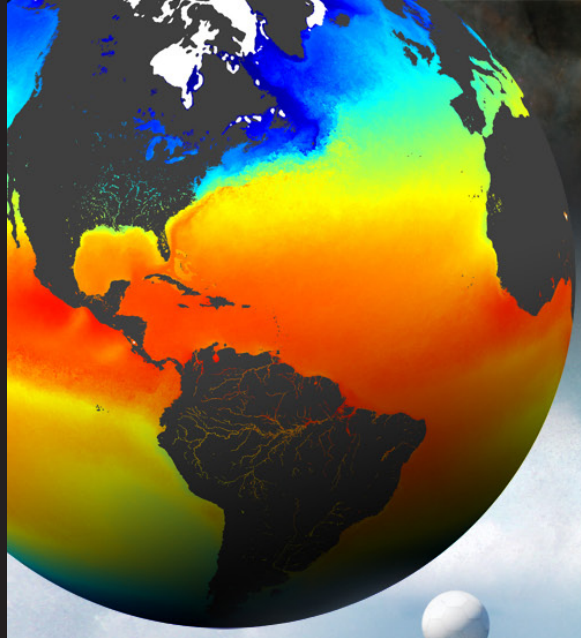
National Research Council, Climate Data Records from Environmental Satellites, 150 pp., National Academies Press, 2004.
Rowley, R.J., J. C. Kostelnick, D. Braaten, X. Li, and J. Meisel, Risk of Rising Sea Level to Population and Land Area, Eos, 88 (9),105-107, 27 February 2007.



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coasts

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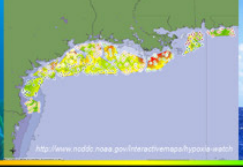

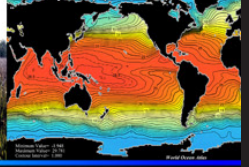

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