

A topographic map of the Gulf of Mexico region, showing the coastline of the United States and Mexico. The map uses a color gradient from light green to brown to represent elevation, with the Gulf of Mexico in shades of blue. A dark teal horizontal band is overlaid across the center of the map, containing the title text.

# Gulf of Mexico Coastal Ocean Observing System

2024 Annual Report



# Introduction

**As the world's climate shifts**, changes are occurring in many ocean parameters, including temperatures, salinity, acidity, currents and sea level. In fact, preliminary data show that 2024 global surface temperatures are the highest they've been in 145 years. Understanding the point at which these changes will affect communities is crucial for mitigating environmental and societal impacts.

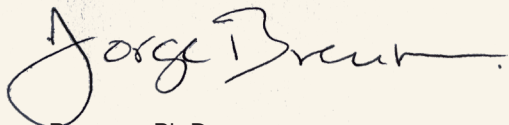
Since 2005, the Gulf of Mexico Coastal Ocean Observing System (GCOOS) has been working to build a robust, sustained, operational network in the Gulf of Mexico that integrates physical, meteorological, biogeochemical, biological, bathymetric and other types of data critical to understanding our changing climate, as well as the short- and long-term impacts of changing weather patterns. We need only to look at a few records from the 2024 hurricane season to see how important the work that GCOOS and our partners undertake is:

- Beryl was the earliest Category 5 storm on record in the Atlantic basin. And though it was a Category 1 storm when it made landfall in Texas, it caused significant storm surge.
- Category 4 Helene, which made landfall in Florida, caused catastrophic flooding and led to more than 150 direct fatalities — the most since 2005's Hurricane Katrina.
- Category 3 Milton, which also made landfall in Florida, came with 46 tornadoes and destructive storm surge. Milton also intensified at the highest rate observed when its wind speeds increased by 90 miles per hour within 24 hours.

Throughout the season, GCOOS and its partners worked behind the scenes to gather the critical data that modelers and forecasters rely on to determine, among other things, how intense storms will be. At the height of the season, we were tracking more than 30 uncrewed systems and assuring that the data needed to make storm predictions was readily available.

While I'm pleased to present this Annual Report, which provides some of the highlights of the work we undertook in 2024, we're also looking ahead to 2025 — when we will celebrate our 20th anniversary — and beyond.

We know that the data gathered by the ocean observing community will only grow in importance in the face of increasingly deadly and costly hazards, and that Gulf Coast communities will rely on GCOOS more than ever. Our efforts today to provide the backbone for ocean data and a network that expands to fill critical information gaps means strengthened communities, healthier ecosystems, a safer marine industry and a more robust blue economy.



Jorge Brenner, Ph.D.  
Executive Director  
Gulf of Mexico Coastal Ocean Observing System

## Our Mission

The GCOOS mission is to provide on-demand information about the Gulf's coastal and open ocean waters that is accurate, reliable and benefits people, ecosystems and the economy.



## GCOOS Board of Directors

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**On the Cover:** 3D rendering of a topographic map of the Gulf of Mexico. All source data is in the public domain. Color texture and rivers: made with Natural Earth. Relief texture: SRTM data courtesy of USGS. Water texture: HIU World Water Body Limits.

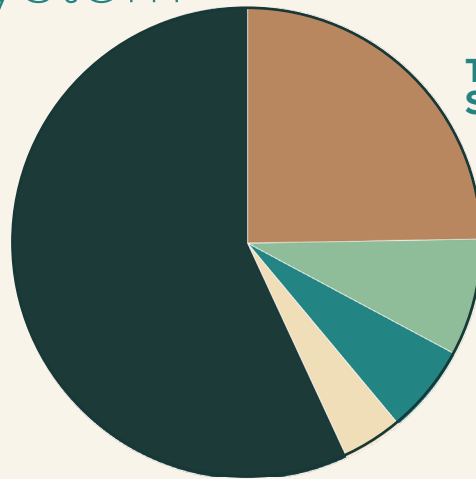
# Funding the System

**GCOOS funding** comes from a variety of sources, with core funding via competitive award through the U.S. Integrated Ocean Observing System (IOOS) office, housed under the umbrella of the National Oceanic and Atmospheric Administration (NOAA). The core funding is awarded in multi-year grants (typically five-year cycles), in cooperative agreements and/or contracts. GCOOS also receives revenue from other sources to bolster its ocean-observing capabilities in the Gulf of Mexico and to develop the tools and products needed by resource managers, emergency responders, offshore energy producers, ocean-related industries and other constituents and stakeholders. GCOOS is currently in year four of a five-year grant cycle, covering July 1, 2024-June 30, 2025. Its core funding is \$4,120,579.

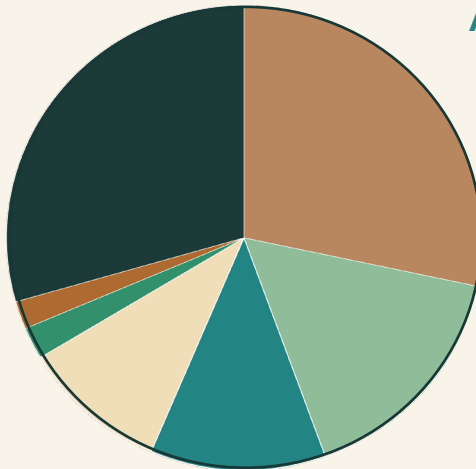
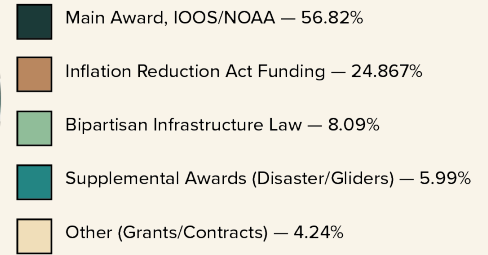
GCOOS also received supplemental awards to fund glider operations during hurricane season and a disaster supplement for principal investigators to make repairs to hurricane-damaged ocean observing infrastructure. Total supplemental awards were \$434,295.

2024 also marked year two of the GCOOS funding award through the Bipartisan Infrastructure Law (BIL), which provides support for coastal resilience projects and infrastructure, and year one of the GCOOS funding award through the Inflation Reduction Act (IRA), which is supporting the equitable service delivery and modernization of the U.S. IOOS Regional Associations. Total BIL and IRA funding awards were \$2,390,067.

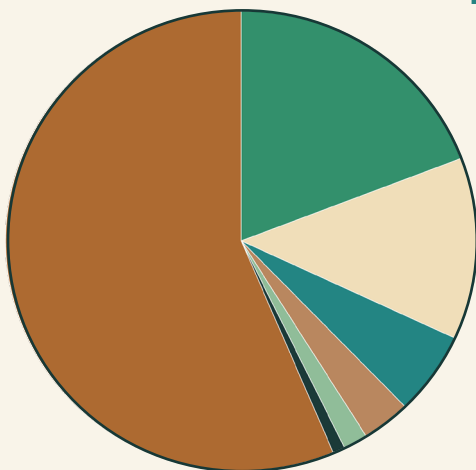
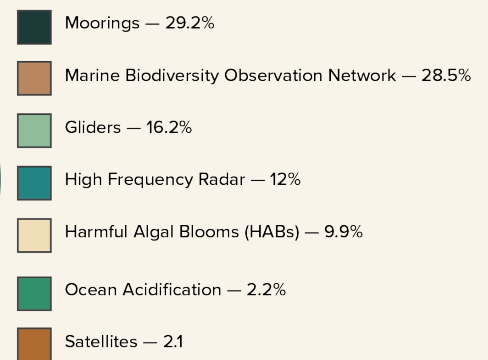
The new IRA funding is supporting existing and new projects in Texas, Louisiana, Mississippi, Alabama and Florida. The projects include deploying assets that complement and fill observation gaps in existing networks, building new asset networks and enhancing regional technical capacity to provide data services to communities to help them build coastal resilience. Through IRA funding, GCOOS is working with front-line and Indigenous communities to measure and equip them with knowledge about surface currents, flooding, harmful algal blooms, rip currents, coral bleaching and other parameters. The five-year IRA projects will also validate offshore data and support the development of multilingual program materials.



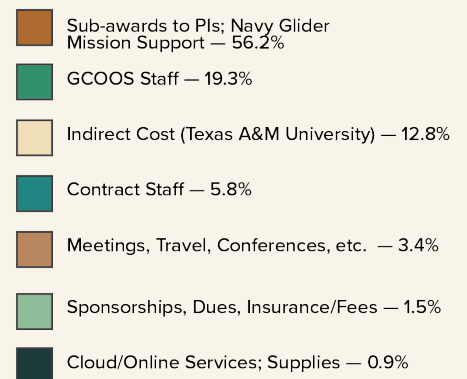
**Total Funding by Source**



**Percent of Main IOOS Award by Project Type**



**Expenses, Main IOOS Award**



For a full listing of sub-award principal investigators and project summaries, see pages 10-11.

# Ocean Tools for Resilient Communities

As the Gulf of Mexico's dedicated coastal and ocean observing system, GCOOS does more than compile and serve raw data to ocean modelers, forecasters and research teams. We also undertake wide-scale projects and develop no-cost tools and products designed to help empower people, communities and businesses with timely, reliable and accurate information that allows them to make decisions about their day-to-day lives.

## Improving Hurricane Forecasts for Public Safety

Hurricanes pose one of the greatest threats to Gulf coastal communities. That's why GCOOS helps to lead a national initiative focused on gathering and disseminating data from uncrewed systems operating in the Gulf and Atlantic. These uncrewed systems — including Slocum gliders, Oceanscouts, Saildrones, Seaglidors and other vehicles — can operate even during dangerous conditions to gather and transmit crucial ocean temperature and salinity data in near-real-time. This timely information can be used by hurricane modelers to help predict how and where storms will develop and how intense they could become, even as the storms make their way to land.

In fact, as 2024's Hurricane Helene was heading toward a Florida landfall in September, the University of South Florida's glider nicknamed Jai Alai was in the storm's direct path. In the days before Helene's landfall, Jai Alai detected a deep reservoir of warm water in the storm's projected path, giving it an abundance of fuel to intensify rapidly. Supercharged by this warm water, Helene grew from a tropical storm to a major Category 4 hurricane in just two days. Having accurate data helped to improve the forecast for the storm before and after it made landfall.

As the National Weather Service (NWS) continues to implement new operational models, data from uncrewed systems, along with AI and machine learning will become even more crucial to storm prediction, says Brian LaMarre, Program Manager for NWS Operations Model Implementation. "AI will be able to assimilate all of these data points even faster than ever before and having more data points will only help us improve our forecasts."



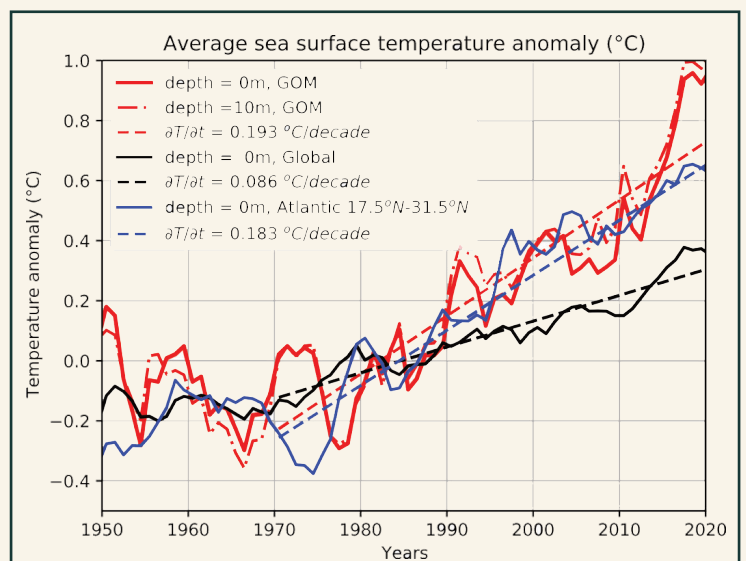
©Texas A&M University Geochemical and Environmental Research Group

GCOOS partners in this national hurricane initiative include Texas A&M University's Geochemical and Environmental Research Group (TAMU-GERG), the University of Southern Mississippi (USM), University of South Florida (USF), Mote Marine Laboratory (MML), the U.S. Navy and NOAA's Atlantic Oceanographic and Meteorological Laboratory (AOML). The data is collected on the piloting dashboard known as GANDALF — [gandalf.gcoos.org](http://gandalf.gcoos.org). Developed by GCOOS, GANDALF provides real-time vehicle positioning information via a maps-based interface with a dashboard display, plots of flight and science sensors, NOAA model comparisons and more.

## Tracking Marine Heatwaves

The world's oceans are getting hotter; in fact, May 2024 was warmer globally than any previous May in the data record. We know that warmer ocean temperatures can mean more frequent and more intense hurricanes, but that's just one impact. Marine heatwaves (MHW) — warmer than normal water temperatures over an extended period — can impact fisheries, coral reefs and even inland temperatures.

GCOOS is partnering with researchers at the University of South Alabama/Dauphin Island Sea Lab (DISL) on a new project focused on MHW. In addition to developing a framework for expected heatwave impacts and a heatwave alert system, the project will define the tools needed for better detection of marine heatwaves — both at the surface and in the water column — to help Gulf stakeholders and resource managers mitigate impacts on coastal communities, ecosystems and industries.



Time series of the sea surface average temperature anomaly for the Gulf of Mexico (red) and northern subtropical Atlantic Ocean, from Wang, Z., T. Boyer, J. Reagan, and P. Hogan, 2023: Upper-Oceanic Warming in the Gulf of Mexico between 1950 and 2020. *J. Climate*, 36, 2721–2734, <https://doi.org/10.1175/JCLI-D-22-0409.1>.



## New Water-Level Sensors for Traditional Communities

The Pointe-au-Chien Indian Tribe's (PACIT) ancestral lands spanning Louisiana's Terrebonne and Lafourche Parishes are experiencing erosion, subsidence, sea level rise and saltwater intrusion. For the Tribe's members, the impacts of these combined climate-related hazards along with extreme weather events are affecting their ability to continue traditional farming, aquaculture, fishing and trapping and threatening their cultural resources and homelands.

Now, through a NOAA-supported climate and equity pilot project funded through the Inflation Reduction Act, GCOOS is working with the Tribe, the Louisiana Universities Marine Consortium (LUMCON), Louisiana State University (LSU) and other partners to collect data and put tools in place that will help the Tribe gain information and help mitigate impacts from these events. The PACIT water-level observatory will include two new stations with water-level gauges, water quality sensors and web cameras focused on monitoring Terrebonne Bay waters that the Tribe depends on for its livelihood. GCOOS will also provide data management support.

"The Pointe-au-Chien community is a fishing community," said Cherie Matherne, the Tribe's Cultural Heritage & Resiliency Coordinator. "This added feature to our community bridges



©Pointe-au-Chien Indian Tribe

our traditional knowledge of fishing these waters with the advanced technology to determine the best or more favorable fishing conditions. Before this was available, fishermen would have to do some math on tide predictions based on what the tide was ranging in Grand Isle. Due to the location and distance of the PACIT community from Grand Isle, this tide gauge (and other environmental sensors) allows the information on the tide to be more readily available."

## Protecting Coastal Communities from Red Tide Impacts

The Red Tide Respiratory Forecast — [www.RedTideForecast.com](http://www.RedTideForecast.com) — is a risk-level forecast for red tide respiratory conditions on Florida and Texas beaches activated during red tides. It allows coastal residents — especially those with chronic lung diseases — to avoid impacts. GCOOS maintains a network of more than 40 volunteers and organizations that gather data using a specialized microscopy system known as HABscope at some 60 beach sites. This low-cost microscope system developed by GCOOS uses AI to classify blooms and feed the data to the automated forecast system. GCOOS is currently improving and deploying HABscope version 2.0 throughout the network. The development of the Red Tide Respiratory Forecast has been supported through the National Centers for Coastal Ocean Science (NCCOS) Monitoring and Event Response for Harmful Algal Blooms (MERHAB) program, the IOOS National Harmful Algal Bloom Observation Network (NHABON) Pilot Program, the Florida Fish and Wildlife Conservation Commission Center (FWC) for Red Tide Research and the Inflation Reduction Act.

## Developing Ocean Acidification Observing Networks

Ocean acidification (OA) puts clam, oyster and other fisheries at risk. The Gulf of Mexico Coastal Acidification Network (GCAN) works with scientists, resource managers, stakeholders and educators to facilitate, synthesize and communicate coastal and ocean acidification science to stakeholders in the Gulf of Mexico. In 2024, the network developed a guideline for decision-making considerations for entities interested in establishing local-to-regional-scale OA observing systems. The guideline includes case studies and best practices for deploying sensors and platforms and applying methodologies to establish and manage OA observations in coastal zones.



## Gulf of Mexico Beach Guide

In 2024, GCOOS updated "All Things Beaches," its Gulf of Mexico beach guide, with additional water quality information from Florida and Alabama. This one-stop-shop covering beaches from Texas to Florida compiles beach data from numerous sources, including the National Weather Service (NWS), the Environmental Protection Agency (EPA), and state and local agencies into a central and easily searchable website giving beachgoers information they need to have a fun, safe day at a Gulf of Mexico beach.

The guide now has an ArcGIS Online map for each Gulf state, including 152 new data points on Florida's water quality status based on information from the state's Department of Health, and weekly water quality status updates from the Alabama Department of Environmental Monitoring (ADEM).

■ Online at [all-things-beaches-tamu.hub.arcgis.com](http://all-things-beaches-tamu.hub.arcgis.com)



# Providing Quality Ocean Data

**GCOOS is a data provider** certified by the National Oceanic and Atmospheric Administration (NOAA) — which means coastal communities can rest assured that GCOOS meets the gold standard for data gathering and management practices and operates inclusively, transparently and with stakeholder guidance to help us determine system priorities. In addition to offering a portal where users can find Gulf coastal and ocean data, we also develop data tools to help support activities such as species restoration and the ocean-based economy.

## Databases for Species Recovery

In 2024, GCOOS launched the CETACEAN (Compilation of Environmental, Threats, and Animal Data for Cetacean Population Health Analyses) data portal. This five-year collaborative project is focused on helping to restore Gulf of Mexico offshore cetacean populations — including common bottlenose dolphins, Atlantic spotted dolphins, Bryde's whales and sperm whales — injured during the Deepwater Horizon spill.

This new geospatial data repository, which was designed to ensure that data are easily searchable and accessible, is hosted on an ESRI-based geo HUB and populated with more than 400 data sources offering information on cetacean populations in a single, searchable location. The repository also includes data on species stressors as available. The project, funded through the Natural Resource Damage Assessment (NRDA) Open-Ocean Restoration Area funds from the Deepwater Horizon Oil Spill with NOAA as the Lead Implementing Trustee and managed by GCOOS, is still ongoing, and the repository will continue to grow as more population data sources are incorporated and threat data is added.

GCOOS is also developing a new Gulf of Mexico Sea Turtle Atlas. This centralized repository of sea turtle data from the Gulf of Mexico will include information on all five Gulf species along with stressors and analytical products. The Atlas, funded by the Deepwater Horizon Open Ocean Trustee Implementation Group, will encompass the entire



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Gulf of Mexico (and further away when necessary), though it will have a special focus on data that will help further the understanding of:

- Leatherback sea turtle habitat use in the Gulf of Mexico;
- Loggerhead, green and Kemp's ridley movements and their use of Louisiana coastal waters;
- The overlap of sea turtle nesting and mating habitat near Port Aransas, Texas.

- To contribute new and historical data to CETACEAN or the Sea Turtle Atlas, email [Megan.Howson@GCOOS.org](mailto:Megan.Howson@GCOOS.org).
- View CETACEAN online at [cetacean.gcoos.org/](http://cetacean.gcoos.org/)

## Establishing Nutrient Sensors for a Healthier Gulf

GCOOS is testing a new data site for the Gulf of Mexico Nutrient Sensor Project (GOM NSP), which is designed to improve the frequency of monitoring Gulf estuaries for dissolved nutrients. Since 2019, the GOM NSP has integrated data from commercially available nutrient sensors into existing monitoring programs, while testing the utility and operability of extensive, real-time nutrient monitoring arrays. The network of nutrient sensors and monitoring partners has been purpose-built for detection in biogeochemically distinct U.S. Gulf estuaries, and the partnerships have facilitated deployment planning and nutrient sensor operations for existing and prospective partners.

With funding from the EPA through NOAA and GCOOS, researchers are working to establish a network of in-situ sensors in coastal and estuarine ecosystems along the Gulf Coast. GCOOS is developing a data site to improve

open-source data dissemination through high-frequency quantification and provisional data transmission that is based on best-practices for quality assurance and quality control (QA/QC) protocol development.

Project partners include the Florida-based Sanibel-Captiva Conservation Foundation (SCCF) and Mote Marine Laboratory (MML); the Grand Bay National Estuarine Research Reserve in Mississippi; Leveraging Opportunities and Strategic Partnerships to Advance Tolerant Oysters for Restoration (LO-SPAT), the University of Louisiana at Lafayette (ULL) and Louisiana Universities Marine Consortium (LUMCON) in Louisiana; as well as Texas A&M University (TAMU) and the University of Texas at Austin (UTA).

- Online at [wq.gcoos.org/sensor\\_pilot/](http://wq.gcoos.org/sensor_pilot/)



# Improving Data Access with Next-Generation Platforms

GCOOS has launched a new ArcGIS Online platform — [gcoos.maps.arcgis.com](https://gcoos.maps.arcgis.com) — to serve the public with quality and accessible datasets and provide the infrastructure for future geographic information systems work. GIS is a computer technology used to create, manage, analyze and map data that provides the ability to relate previously unrelated information through the use of location as a key index variable. Both CETACEAN and the Sea Turtle Atlas utilize the new ArcGIS platform.

Hand-in-hand with the new platform comes Erddap2agol, the new GCOOS open-source Python Package that creates, manages and administers ERDDAP™ data on ArcGIS Online. ERDDAP™ (formerly known as the Environmental Research Division Data Access Program) is a data service that standardizes access to oceanographic and atmospheric datasets that users can request in a variety of common file types.

The new Erddap2agol runs within the ArcGIS online environment, allowing for an easy setup by any user — even those with virtually no programming experience. Single users can create ERDDAP™ datasets and DMAC teams can use it to administer ERDDAP™ data on ArcGIS Online.

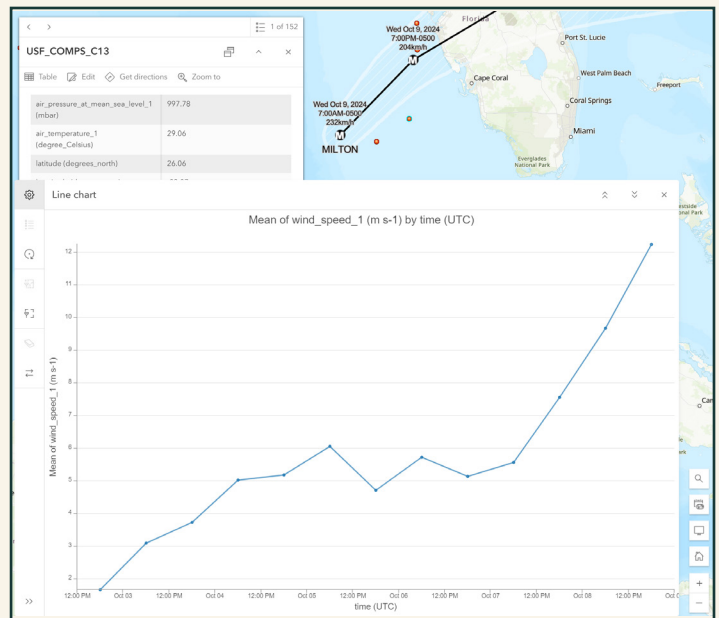
Erddap2agol is in active development and we recently reached our first milestone with the release of version 0.4. Users have the ability to create static or near real-time (NRT) ERDDAP datasets on ArcGIS Online from a selection of 53 ERDDAP™ services.

## Data Milestone for Public-Private Partnership

GCOOS hit a big data milestone in August when it surpassed the 500-million mark for data records of ocean currents. GCOOS holds the Bureau of Safety and Environmental Enforcement (BSEE)/Notice to Lessees (NLT) Data Repository and Registry, where we collate and curate oceanographic data gathered by offshore oil and gas platform operators. This continuing contribution from the private sector is a mark of their commitment to sharing oceanographic data in support of industry safety and overall public interest. The GCOOS BSEE/NLT repository receives data from 50 active stations, including mobile offshore drilling units (MODU), and also houses all the data reported previously via the NOAA National Data Buoy Center (NDBC) and distributes it via our ERDDAP data endpoint and Web Accessible Folder

In 2024, we updated the system to allow users to visualize the station's ocean currents in 2D or 3D formats. The 2D plot is of the last seven days for all the depths where data are reported, and the 3D plot for the last three hours of data. The 3D plotting routine is user-interactive, allowing users to turn the image to a desired orientation using the drag function of computer mouse.

- BSEE/NLT station inventory online at [ntl.gcoos.org/station\\_inventory.php](https://ntl.gcoos.org/station_inventory.php)
- Offshore wind assessment tool online at [experience.arcgis.com/experience/dda5a6fc6a1b485da0418ded885641b7](https://experience.arcgis.com/experience/dda5a6fc6a1b485da0418ded885641b7)



We conducted our first live test of the Erddap2agol's NRT functionality as Hurricane Milton made its way through the Gulf of Mexico. Of the 30 active GCOOS NRT sensors, five were in the hurricane's path, allowing us to plot, map and visualize data in near real-time as the storm progressed.

- Online at [github.com/GCOOS/erddap2agol](https://github.com/GCOOS/erddap2agol)



© RWE Offshore Wind GmbH

## Data in Support of Wind Industry Development

In 2024, GCOOS and ESRI teamed up to create a tool designed to help assess suitable offshore areas for wind energy projects. The GIS-based tool allows users to input thresholds for selectable biophysical variables. The goal of this app is to provide managers and industry with a transparent decision-support tool capable of generating alternate scenarios to identify spatial footprints of future projects. This effort constitutes a collaboration between ESRI, the leader for GIS and geospatial data, and GCOOS in the Gulf of Mexico. The tool will continue to be updated as more relevant data becomes available.

With the Bureau of Ocean Energy Management (BOEM) scheduling offshore wind lease sales for the Gulf of Mexico to take place in 2025, the decision-support tool will be a timely resource for offshore wind development.

# GCOOS News in Brief

## New Pan-Regional Initiative to Fill Gaps in Ocean Data

GCOOS has teamed up with the Southeast Coastal Ocean Observing System (**SECOORA**) and the Caribbean Coastal Ocean Observing System (**CARICOOS**) on a new initiative that will set the stage for a greater understanding of the connections among the North Equatorial Current, the Caribbean Current/Gulf Stream and the Loop Current, and fill data gaps for forecasting and responding to environmental events and changes.

The “Intra-American Seas Pan-Regional Ocean Observing Initiative” builds on the joint projects already being undertaken by the regional ocean observing associations and will serve as a platform to launch additional joint projects in support of coastal communities.

“Each of our regions are significantly connected downstream of the North Equatorial Current, and by working more closely together, we have the opportunity to further improve and integrate our understanding of the connections in our shared oceans,” said GCOOS Executive Director Dr. Jorge Brenner.

The Initiative will begin with a focus on several main priorities, including:

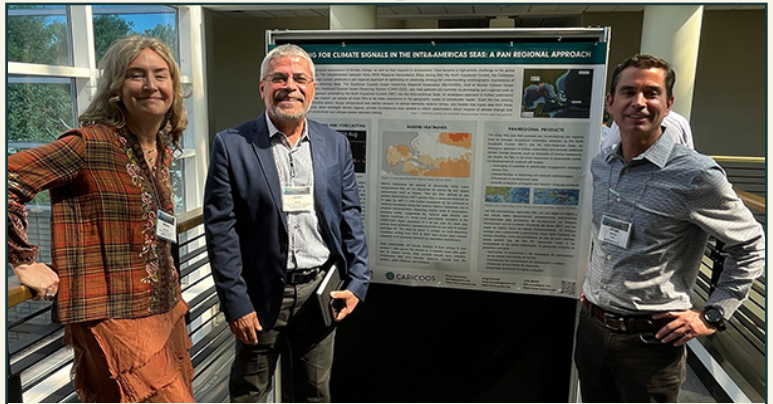
- System-wide phenomena and hazards — improving hurricane intensification forecasting via underwater glider missions;
- Climate signal detection — assessing and sharing information about marine heatwaves;
- Joint products — tracking things like the expanded geographic range of sargassum, which is now thriving in the open ocean;
- Cross-boundary expertise sharing — increased collaboration will allow each region to grow expertise in key areas;

## Changes at the Top

During the GCOOS Fall Meeting, the Board of Directors installed new officers:

- **Dr. Kimberly Yates**, Board Chair
- **Suraida Nañez-James** (Gulf Reach Institute), Vice Chair
- **Jan van Smirren** (DHI Water and Environment and Ocean Sierra, LLC), Treasurer
- **Dr. Stephan Howden** (University of Southern Mississippi), Secretary
- **Kirsten Larsen** (NOAA-NCEI), Immediate Past Chair

This year also marked the retirement of three long-serving members of the GCOOS Board: **Joe Swaykos**, **Bill Lingsch** and **Dr. Alyssa Dausman**. They have provided unwavering support to the organization and, collectively, helped to develop and update the GCOOS Strategic Plan, improve and update the Build-Out Plan and provide overall guidance for GCOOS’s strategic vision. We can’t thank each of them enough for the time and effort they’ve provided to help make GCOOS a stronger regional association and we wish them all well!



The Executive Directors from SECOORA, CARICOOS and GCOOS presented the Pan-Regional Initiative during the Climate Variability and Predictability Program (CLIVAR) workshop. From left: **Debra Hernandez**, SECOORA, **Dr. Julio M. Morell**, CARICOOS and GCOOS’s **Dr. Jorge Brenner**.

- Product development co-design — for example, instead of having a tool like the Sargassum Forecast focused solely on the Caribbean, it can be widened to include the larger southeastern Atlantic, where blooms are a growing problem.

GCOOS, SECOORA and CARICOOS are already collaborating on two projects:

- Developing a better understanding of the locations and impacts of coastal and marine heatwaves and
- Gathering field data and mapping sargassum inundation offshore and along beaches. Sargassum is a type of floating brown algae that forms large mats and can have devastating impacts on coastal communities when they wash ashore.

GCOOS also welcomed newly elected members to the Board: **Dr. Emily Hall**, Mote Marine Laboratory, and **Dr. Rafael Ramos**, Woods Hole Group, to represent the Private Sector, and **Dr. Brian**

**Roberts**, Louisiana Universities Marine Consortium (LUMCON), who will represent the Outreach and Education Sector. Two Directors were also reelected: **Dr. Kate Hubbard**, Florida Fish and Wildlife Conservation Commission-Fish and Wildlife Research Institute, representing the Government Sector, and **Dr. Nick Shay**, University of Miami, Rosenstiel School of Marine and Atmospheric Science (RSMAS), representing the Academic Sector.



New Board Chair **Dr. Kimberly Yates** (left) with Immediate Past Chair **Kirsten Larsen** at the GCOOS 2024 Spring Members’ Meeting in Galveston, Texas.



# New GCAN Steering Committee Chair

Welcome to **Dr. Xinping Hu**, who has taken the role of GCAN Steering Committee Chair for 2025. Hu recently joined the University of Texas at Austin Marine Science Institute as a professor and previously served as research chair at the Harte Research Institute for Gulf of Mexico Studies at Texas A&M University-Corpus Christi. He has spent the last 10 years working on the hydrological influence on estuarine carbon biogeochemistry and, in more recent years, on ocean acidification in the northwestern Gulf of Mexico in collaboration with the Flower Garden Banks National Marine Sanctuary. His research on ocean acidification has been funded by NOAA, NSF and EPA through its Coastal Bend Bays and Estuaries Program.



# GCOOS Staff News

GCOOS Senior Advisor **Dr. Barbara Kirkpatrick** was appointed to the U.S. IOOS Federal Advisory Committee, which advises the NOAA Administrator and the Interagency Ocean Observation Committee (IOOC) in fulfillment of the Integrated Coastal and Ocean Observation System Act. Kirkpatrick has also been appointed to a three-year term on the NOAA Science Advisory Board's Ecosystem Sciences and Management Working Group, which focuses on the research, monitoring and management components of NOAA's ecosystem portfolio and observations and data management issues.

GCOOS welcomed three new staff members in 2024:

- **Dr. Renata Poulton Kamakura**, GCOOS's first National Academy of Sciences Gulf Research Program Science Policy Fellow. Kamakura will support an ongoing project related to coastal and marine heatwaves; specifically helping to model the relationship between elevated sea-surface temperatures and the climates in coastal and near-shore terrestrial (especially urban) communities.
- **Jerad King**, GCOOS GIS Developer. He manages the GCOOS Enterprise GIS strategy, and supports marine life work through the CETACEAN and sea turtle atlas projects, as well as the maintenance and development of new and existing GCOOS GIS-based applications and projects.
- **Megan Howson**, Marine Mammal Biologist and Data Scientist. She is focused on developing the CETACEAN and sea turtle atlas databases.

GCOOS also welcomed two new Fellows: **Matthew Barrs**, an undergraduate studying mechanical engineering in the Burnett Honors College at the University of Central Florida, and **Cassandra Stanish**, an undergraduate studying mechanical engineering at the Florida Institute of Technology.

The Fellowships are supported through the Howard Scholarship Fund, named in honor of Dr. Matt Howard, a founding member of GCOOS and an oceanographer at Texas A&M University. To support future fellows, donate at [GCOOS.org/howard-scholarship-fund/](https://GCOOS.org/howard-scholarship-fund/).

# Partner Milestones

## 75 Years of TAMU Oceanography

Congratulations to the Oceanography Department at Texas A&M University, which celebrated its 75th anniversary in 2024. The Department, which houses GCOOS, was established in 1949 under the auspices of the University Land Grant mission to assist the state with emerging challenges in the Gulf of Mexico dealing with oyster diseases, coastal disasters and oil platform and pipeline design. The Department of Oceanography has maintained significant research programs in Galveston and the Department has produced more than 1,000 Ph.D. and master's graduates since its inception.



## 36 Years of Satellite Observations

Congratulations also go to GCOOS Board Member Dr. Nan Walker and the team at Louisiana State University's Earth Scan Laboratory, which celebrated its 36th anniversary in June. ESL operations started with a tracking antenna mounted on the roof of an LSU building to capture imagery from a NOAA polar-orbiting satellite. Today, ESL has expanded to near real-time image processing, providing near real-time ocean and atmosphere satellite images for many applications in emergency response, education and research.



## 20 Years On: The Gulf of Mexico Alliance

In 2003, the Pew Oceans Commission and the U.S. Commission on Ocean Policy called for regional collaborations to protect and restore America's oceans. A year later, the governors of Alabama, Florida, Louisiana, Mississippi and Texas created the Gulf of Mexico Alliance. The partnership network works on region issues while it provides forums for collaboration, develops and modifies tools to address regional issues, enables strategic partnerships and tracks restoration efforts.



## 10 Years of Marine Biodiversity Observations

The U.S. Marine Biodiversity Observation Network (MBON) marked its 10th anniversary in 2024, celebrating a decade of tracking changes in biodiversity in our oceans. As a collaborating partner, GCOOS works on stakeholder engagement and outreach and developing data platforms that offer consistent downloads of scientific datasets in common file formats. MBON works to establish standard approaches for data sharing so resource managers can detect changes in biodiversity and abundance. Partners have been integrating biological data on everything from genes to habitats and linking observations to abiotic environmental variables, identifying site projects within national marine sanctuaries to incorporate environmental forcing and biogeography, and using integrated products to adaptively manage living marine resources.



Principle Investigator	Organization	Project
Main GCOOS-Award-Funded Projects		
Dr. Lisa Campbell & Dr. Darren Henrichs	Texas A&M University (TAMU)	Texas Observatory for Algal Succession Time Series (TOAST) — high-resolution time series for observations of long-term trends and prediction of HABs in Texas
Dr. Zach Cobell & Hugh Roberts	The Water Institute (TWI)	Evaluation of operational modeling frameworks and model coupling for water-level forecasting
Dr. Arne Dierks & Dr. Stephan Howden	University of Southern Mississippi (USM)	Sustained coastal monitoring of surface currents in the Mississippi Bight through the Central Gulf of Mexico Ocean Observing System; northern Gulf of Mexico glider sentinel line; ocean acidification (OA) monitoring in the hypoxic zone of the Louisiana Shelf
Dr. Steve DiMarco & Dr. Tony Knap	Texas A&M University's Geochemical and Environmental Research Group (TAMU-GERG)	Maintenance and Operation of the Texas high frequency radar (HFR) network; system upgrades to the Texas automated buoy system; Glider operations in support of tropical cyclone intensification forecasts
Dr. Brian Dzwonkowski	Dauphin Island Sea Lab (DISL)	Gulf of Mexico harmful algal bloom (HAB) pilot testbed project; coastal monitoring from Alabama's real-time coastal observing system (ARCOS)
Dr. Chris Fuller	Rates Inc.	Galveston Bay and Sabine Lake HFR networks (repair funds)
Felimon Gayanilo	Texas A&M University-Corpus Christi (TAMUCC)	Support services to maintain and enhance interoperable data portals for GCOOS and OA monitoring at a coastal bay in Texas
Dr. Sharon Herzka	University of Texas Marine Science Institute (UTMSI)	Validation and monitoring of holoplanktonic sargassum along the Texas coastal bend
Dr. Ken Hoadley & Dr. Behzad Mortazavi	University of Alabama (UA)	HAB pilot testbed project
Dr. Chuanmin Hu, Chad Lembke, Dr. Mark Luther & Dr. Frank Muller-Karger	University of South Florida (USF)	Maritime transportation, satellite Earth observations and glider deployments
John Langan	Mote Marine Laboratory (MML)	Maintenance and augmentation of an existing HAB observatory
Dr. Robert Leben	University of Colorado (UC)	Continued development of the Gulf of Mexico Coastal Ocean Observing System with satellite altimetry data
Dr. Chunyan Li & Dr. Nan Walker	Louisiana State University (LSU)	Satellite remote sensing
Dr. Eric Milbrandt	Sanibel-Captiva Conservation Foundation (SCCF)	Real-time water quality and weather for Southwest Florida from the River, Estuary and Coastal Observing Network (RECON)
Dr. Beth Stauffer	University of Louisiana-Lafayette (ULL)	Building a nutrient-sensing network in the northern Gulf of Mexico, Phase I
Dr. Kerri Whilden & Ben Williams	FUGRO	Continued maintenance for Louisiana HFR in Port Fourchon and Southwest Pass, Louisiana
Bipartisan Infrastructure Law Projects		
Pat David & Dr. Brian Dzwonkowski	DISL	Real-time water current velocity and wave data for ARCOS
Dr. Arne Dierks & Dr. Stephan Howden	USM	Infrastructure for the Central Gulf of Mexico Ocean Observing System
Felimon Gayanilo	TAMU-CC	GCOOS DMAC modernization and resilience building



Principle Investigator	Organization	Project
Dr. Cathrine Hancock & Kevin Speer	Florida State University (FSU)	HFR network expansion, Florida Panhandle
Chad Lembke	USF	GCOOS/NOAA Infrastructure Procurement with USF
Inflation Reduction Act Funded Projects		
Dr. Sue Lowerre-Barbieri	University of Florida (UFL)	Integrated Tracking of Aquatic Animals in the Gulf of Mexico (iTAG): building membership, a database and national and international tracking capacity
Dr. Matt Bethel	LSU	Supporting Coastal Resilience with the Pointe-au-Chien Indian Tribe (PACIT) through inundation sensor technology and traditional ecological knowledge
Dr. Brian Dzwonkowski	DISL	Expanding the availability of real-time wave data to support rip-current prediction in the Mississippi Bight
Dr. Chris Fuller	Rates Inc.	Operation and maintenance of the Galveston Bay and Sabine Lake HFR networks
Felimon Gayanilo	TAMU-CC	BSEE/NTL continuing maintenance and system synchronization with Bureau of Ocean Energy Management (BOEM) records
Dr. Cathrine Hancock	Florida State University (FSU)	Florida Panhandle HFR station operation and maintenance
Dr. Stephan Howden	USM	Publicly providing surface currents and waves data from western Mississippi Sound
Dr. Michelle Johnston	Flower Garden Banks National Marine Sanctuary (FGBNMS)	Filling gaps in near real-time data for the remote Flower Garden Banks National Marine Sanctuary in the Gulf of Mexico
Mike Lee	United States Geological Survey (USGS)	Expansion of OA monitoring in the Gulf of Mexico and development of a GCOOS-OA monitoring network and data delivery approach – Galveston Bay/Tampa Bay pilot study
Chad Lembke	USF	Gulf of Mexico ecosystem monitoring with underwater gliders
Dr. Antonietta Quigg	Texas A&M University-Galveston (TAMU-G)	Connecting the dots: utilizing data from a bench-top Imaging FlowCytobot (IFCB) to provide information on phytoplankton community dynamics while monitoring for HAB species
Dr. Rafael Ramos	Woods Hole Group (WHG)	Quality Assurance/Quality Control (QA/QC) and curation of NTL current profile measurements in the Gulf of Mexico
Dr. Brian Roberts	Louisiana Universities Marine Consortium (LUMCON)	Environmental monitoring network: providing critical data to the Gulf Coast community
Dr. Brian Roberts	LUMCON	Environmental monitoring network: Providing Critical Data to the PACIT community
Disaster Supplement Funded Projects		
John Langan	MML	Replacing a programmable hyperspectral seawater scanner (PHySS)
Dr. Eric Milbrandt	SCCF	Rebuilding the River, Estuary and Coastal Observing Network (RECON)

# Looking Ahead: GCOOS at 20!

In 2025, GCOOS will celebrate its 20th anniversary as the Gulf of Mexico's regional ocean observing system. The anniversary will offer the opportunity to raise awareness about GCOOS's role providing on-demand information about the Gulf's coastal and open-ocean waters that is accurate, reliable and benefits people, ecosystems and the economy. Key activities will include events at the Gulf of Mexico Alliance All-Hands Meeting in Biloxi, Mississippi, in May and an expanded in-person Fall Members Meeting in the Fall of 2025.

The GCOOS Board will also develop the newest version of the GCOOS Strategic Plan, which provides the broad framework for GCOOS operations and activities.

Be sure to sign up for our eNewsletter for updates on our

anniversary activities and other news from the Gulf of Mexico's ocean observing community:

[www.GCOOS.org/Newsletter](http://www.GCOOS.org/Newsletter).

Throughout 2025, GCOOS will highlight historical activities from our members, data providers and data users. To share your organization's historical images, video, data and data products, email GCOOS Communications Lead Nadine Slimak at [Nadine@VettedCommunications.org](mailto:Nadine@VettedCommunications.org).



**GCOOS**  
GULF OF MEXICO  
COASTAL OCEAN  
OBSERVING SYSTEM



## Key Access Points for GCOOS Data and Products

### Main Website

- [www.GCOOS.org](http://www.GCOOS.org)

### Main Data Portal

- [data.gcoos.org](http://data.gcoos.org)

### GCOOS ArcGIS Site

- [gcoos.maps.arcgis.com](http://gcoos.maps.arcgis.com)

### Data by Type

- Moorings and coastal stations: [data.gcoos.org](http://data.gcoos.org)
- High frequency radar: [data.gcoos.org/hfradar](http://data.gcoos.org/hfradar)
- Autonomous underwater and surface vehicles: [gandalf.gcoos.org](http://gandalf.gcoos.org)
- Bureau of Safety and Environmental Enforcement (BSEE) Notice to Lessees (NTL): [ntl.gcoos.org](http://ntl.gcoos.org) and station inventory: [ntl.gcoos.org/station\\_inventory.php](http://ntl.gcoos.org/station_inventory.php)
- Water quality: [wq.gcoos.org/](http://wq.gcoos.org/)
- Estuary nutrient monitoring pilot project: [wq.gcoos.org/sensor\\_pilot](http://wq.gcoos.org/sensor_pilot)
- Historical meteorology: [boem.gcoos.org](http://boem.gcoos.org)
- Models: [modelhandler.gcoos.org/](http://modelhandler.gcoos.org/)

### Key Current and Historical Repositories

- Cetacean species in the Gulf: [cetacean.gcoos.org/](http://cetacean.gcoos.org/)
- Oceanographic and meteorological data and near-real-time data from in-situ observing systems: [erddap.gcoos.org/erddap/index.html](http://erddap.gcoos.org/erddap/index.html)
- Biological and socioeconomic data: [gcoos4.tamu.edu/erddap/index.html](http://gcoos4.tamu.edu/erddap/index.html)
- Historical collection of oceanographic and meteorological data: [gcoos5.geos.tamu.edu/erddap/index.html](http://gcoos5.geos.tamu.edu/erddap/index.html)

### Data Products for the Public

- The Red Tide Respiratory Forecast: [www.RedTideForecast.com](http://www.RedTideForecast.com)
- All Things Beaches: [all-things-beaches-tamu.hub.arcgis.com/](http://all-things-beaches-tamu.hub.arcgis.com/)
- Offshore wind assessment tool: [experience.arcgis.com/experience/dda5a6fc6a1b485da0418ded885641b7](http://experience.arcgis.com/experience/dda5a6fc6a1b485da0418ded885641b7)



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A topographic map of the Gulf of Mexico region, showing the coastline of the United States and Mexico. The map uses a color gradient from light green to brown to represent elevation, with the Gulf of Mexico in shades of blue. A semi-transparent teal banner is overlaid across the center of the map.

# Gulf of Mexico Coastal Ocean Observing System

2024 Annual Report