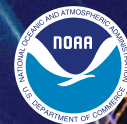


# Gulf of Mexico 2018

NOAA Ship *Okeanos Explorer*

April 11 – May 3, 2018

This expedition was the final of three expeditions intended to increase our understanding of the deep-sea environment in the Gulf of Mexico.



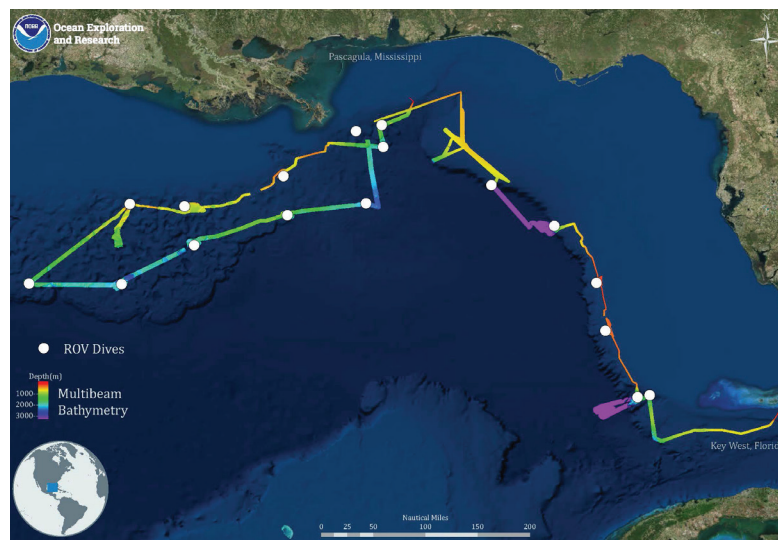
Ocean Exploration  
and Research

## Summary Accomplishments

The **Gulf of Mexico 2018** was a 23-day telepresence-enabled expedition to collect critical information and acquire data on priority exploration areas identified by the ocean management and scientific communities. The goal of the expedition was to use remotely operated vehicle (ROV) dives in combination with seafloor mapping operations to increase our understanding of deep-sea ecosystems and collect scientific information to support future management decisions. Major accomplishments from this expedition are summarized below.

**Conducted 15 ROV dives** ranging in depth from 305 to 3,010 meters (1,001 to 9,875 feet) to explore the diversity and distribution of deep-sea habitats and associated marine communities in the Gulf of Mexico basin. Operations focused on characterizing deep-sea coral and sponge communities, bottomfish habitats, submarine canyons, shipwrecks, and chemosynthetic habitats such as brine pools, gas seeps, and mud volcanoes. Midwater exploration at depths ranging from 900 to 300 meters (2,952 to 984 feet) was also conducted during two dives to investigate the diversity and abundance of the largely unknown pelagic fauna. Highlights from the dives include:

- Observed hundreds of different species of animals, including several potential new species, new behaviors, and numerous significant range extensions. Some noteworthy observations included:
  - Unusual behavior of a potentially new species of squid seen at about 850 meters (2,789 feet) during Dive 04 of the expedition.
  - Coral and sponge communities documented during 12 of the ROV dives (Dives 03 - 15), including five high-density communities of deep-sea corals, one of which is currently among the deepest high-density communities (2,600 meters) known from the Gulf of Mexico.



Overview map showing seafloor bathymetry and ROV dives completed during the **Gulf of Mexico 2018** expedition. Map courtesy of the NOAA Office of Ocean Exploration and Research.



This unidentified squid (possibly *Discoteuthis discus* in the family Cycloteuthidae) was imaged during Dive 04 of the expedition at an unnamed mound in East Breaks 1009. The behavior seen in this picture was described as “probably the most bizarre squid I’ve ever seen” by cephalopod expert, Mike Vecchione from NOAA’s National Marine Fisheries Service. Image courtesy of the NOAA Office of Ocean Exploration and Research, Gulf of Mexico 2018.

- o First-time documentation of several species of sea stars feeding, including one feeding on a black coral.
- o First-ever scientific surveys with submersibles in unexplored areas of Perdido Canyon.
- o Possible first-ever *in situ* observation of the rare sea star, *Remaster palmatus* (family Korethrasteridae).



Bow end view into the hull of the wreck of the tugboat *New Hope*. In 1965, the U.S. Coast Guard performed a daring helicopter rescue of the *New Hope's* crew during Tropical Storm Debbie and saved everyone aboard. Dive 01 included the first ever collection of images at this submerged maritime heritage site. *Image courtesy of the NOAA Office of Ocean Exploration and Research, Gulf of Mexico 2018.*

- Collected 67 biological samples (22 primary and 45 associated and commensal taxa). Thirteen of the biological samples represent substantial range extensions, and several of these may be new species to science.
- Surveyed two sites near priority areas identified by the Gulf of Mexico Fishery Management Council for potential future establishment of Habitat Areas of Particular Concern (HAPC). Information collected during those dives will provide critical baseline information to inform science and management decisions.
- Explored two proposed expansion areas for the Flower Garden Banks National Marine Sanctuary to collect critical baseline information to inform science and management needs.
- Explored two archeological sites to support Bureau of Ocean Energy Management (BOEM) and NOAA maritime heritage programs, resulting in 3D models of both sites.
  - o During Dive 01, archaeologists and scientists explored the shipwreck of the tug boat *New Hope* for the first time. Information collected during the dive confirmed the identity of the wreck, and might help support an application of the *New Hope* shipwreck to the National Register of Historic Places.
  - o During Dive 02, archaeologists and scientists performed a reconnaissance survey of an unidentified wooden vessel with a limited number of metal items inside that may be related to propulsion or steering (e.g., prop shaft or rudder post).

**Mapped more than 21,100 square kilometers of seafloor in the Gulf of Mexico U.S. Exclusive Economic Zone (EEZ).**

- These included several areas that had never been mapped with high-resolution multibeam sonars, such as portions of Perdido Canyon, Pourtales Terrace, and the West Florida Escarpment.
- Multibeam mapping operations also revealed two new gas seep fields at Whiting Dome and Walker Ridge 488.



During Dive 06, scientists observed a small (1.2 meter in diameter) brine pool at 1,067 meters (3,500 feet) depth. Panning up from the pool, this extinct brine waterfall with abundant dead mussel shells was imaged. *Image courtesy of the NOAA Office of Ocean Exploration and Research, Gulf of Mexico 2018.*

**Investigated a variety of different geological features** including gas seeps, mud volcanoes, asphalt seeps, and brine pools. Highlights include:

- Collected 12 rock samples that can be used for geochemical composition analysis and age-dating to increase the understanding of the formation of these features.

- Documented two new chemosynthetic communities during two ROV dives (Dives 06 and 07) including a brine pool and extinct brine waterfall at Hidalgo Basin and gas seeps at Walker Ridge 488.
- Exploration of previously unmapped and unexplored sinkholes on the Pourtales Terrace.

**Collected more than 11.2 TB of data**, including multibeam, single beam, subbottom, ADCP, XBT, CTD and dissolved oxygen profiles, surface oceanographic and meteorological sensors, video, imagery, and associated dive and video products. All of the data from this expedition will be made publically available through national archives.

### **Engaged with audiences around the world, opening a window to the deep sea.**

- Shared the live video feeds of the expedition with the public worldwide via the Internet, with the live video receiving more than 300,700 views via the NOAA Office of Ocean Exploration and Research (OER) YouTube channel. Expedition content on the OER website received over 99,700 views.
- Conducted a successful Facebook Live question and answer session that answered over 20 questions and received over 4,000 views.
- 85 scientists, managers, and students from 35 institutions in the United States, Japan, Russia, Norway, United Kingdom, and Canada participated as members of the science team through telepresence.
- Received news and media coverage by various media sources including National Geographic, Ocean Conservancy, Business Insider, New Zealand Herald, Daily Mail, ScienceAlert, Live Science, Inquisitr, Washington Post, Oceans Deeply, as well as others.
- Conducted two tours of NOAA Ship *Okeanos Explorer* for Congressional Staffers and 20 students from St. Stanislaus College in Mississippi.
- Conducted 16 live telepresence interactions with various groups engaging more than 400 individuals including the Exploratorium, National Aquarium, Boston College, Hawaii Pacific University, London Natural History Museum, among many more.