

Gulf of Mexico 2017

NOAA Ship *Okeanos Explorer*
November 29 – December 21, 2017

This expedition is the first of three expeditions planned to increase our understanding of the Gulf of Mexico, with two additional cruises scheduled for Spring 2018.

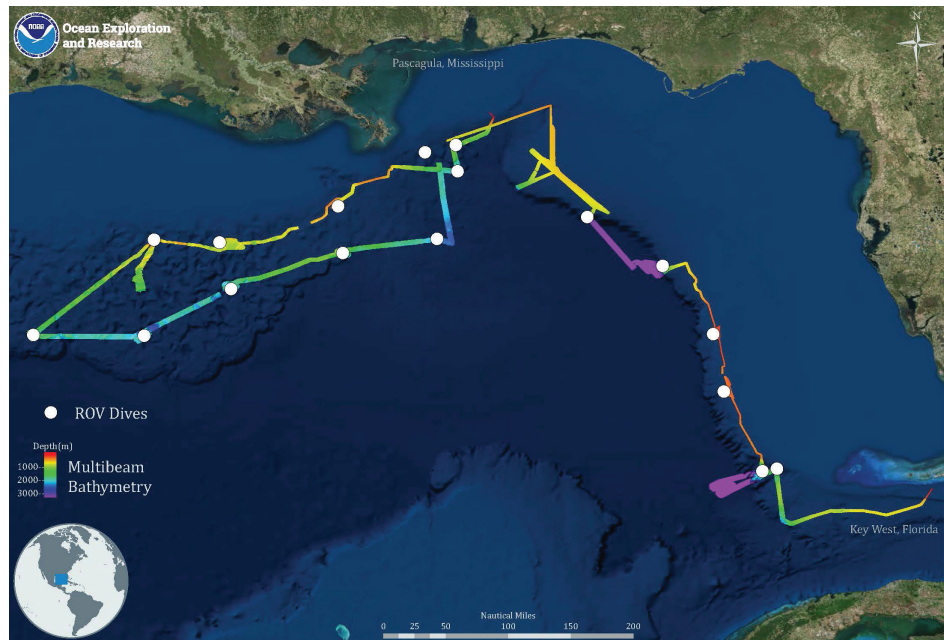


Summary Accomplishments

The Gulf of Mexico 2017 expedition was a 23-day telepresence-enabled expedition to collect critical information and acquire data on priority exploration areas identified by ocean management and scientific communities. The goal of the expedition was to use remotely operated vehicle (ROV) dives and seafloor mapping operations to increase the understanding of the deep-sea ecosystems in these areas to support management decisions. Major accomplishments from this expedition are summarized below.

Conducted 17 ROV dives ranging in depth from 300 to 2,321 meters (984 to 7,615 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; shipwrecks; and chemosynthetic habitats such as cold seeps, mud volcanoes, asphalt seeps, and brine pools. Midwater exploration at depths ranging from 300 to 900 meters (984 to 2,953 feet) was also conducted on four 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 records for the region, and several significant range extensions. Several organisms were also seen alive for the first time. Some observations of note included:
 - o Novel, rare, and unusual deep-sea fishes, including a marine smelt at a shallow depth of 900 meters (2,953 feet);
 - o First *in situ* observation of a synphobranchid eel and skate;
 - o Several swordfish observed at depth, including one feeding;
 - o Feather star gardens on hard substrates previously undocumented in the Gulf of Mexico and Western Atlantic;

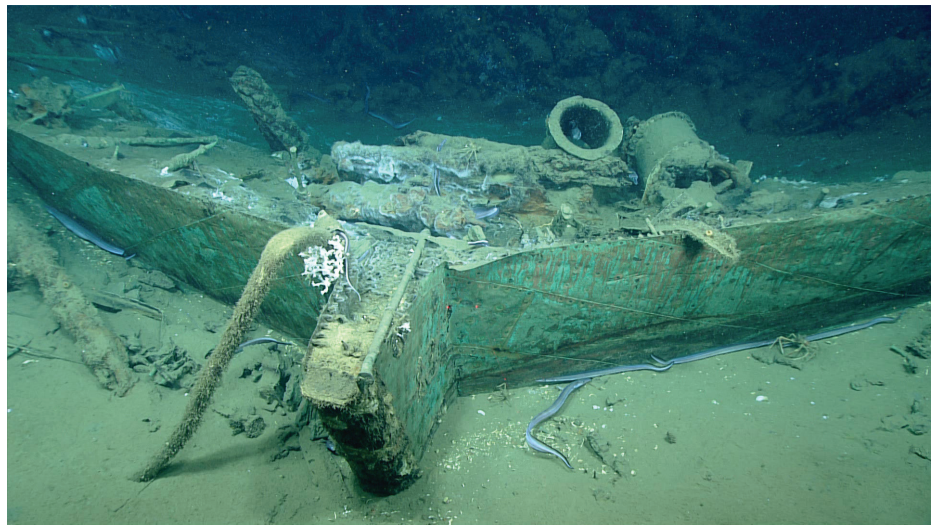


Overview map showing seafloor bathymetry and ROV dives completed during the 2017 Gulf of Mexico expedition. Map courtesy of the NOAA Office of Ocean Exploration and Research.

- o The first record of the crinoid family Hyocrinidae (a probable new species) in the tropical Western Atlantic, and a likely new and locally abundant species of Thalassometridae;
 - o At least four species of carnivorous sponges.
- Observed commercially important species including fishes (silver roughy and Darwin's slimehead) and invertebrates (golden crab, red crab, and royal red shrimp).
 - Collected 105 biological samples (32 primary and 73 associated and commensal taxa) on both geological and biological samples, several of which may be undescribed species.
 - Documented at least nine high-density and high-diversity coral and sponge communities.
 - Surveyed five Habitat Areas of Particular Concern (HAPCs) proposed by the Gulf of Mexico Fishery Management Council in order to collect critical baseline information to inform science and management needs. Four of these sites hosted high-density deep coral and sponge communities and one had extensive chemosynthetic communities.
 - Explored six Flower Garden Banks National Marine Sanctuary proposed expansion zones to collect critical baseline information to inform science and management needs. High-diversity and density coral and sponge communities were discovered at two areas, including a spectacular *Madrepora oculata*-dominated coral garden. Chemosynthetic communities, including brine rivers, large mussel beds, and asphalt seeps were observed in five of these proposed expansion zones.
 - Surveyed the wreck of an early 19th-century copper-clad merchant vessel carrying artifacts including glass bottles, ceramic and porcelain vessels, remnants of a suction bilge pump with cast-iron flywheels, an anchor, and a cast-iron stove. Carried out a series of video transects along and across the forepart of the wreck to supply imagery for a [3D digital reconstruction](#) (courtesy of BOEM) of the wreck. Chemosynthetic fauna were observed within the wreck, likely from the presence of the degrading wood structure.



Fish experts on the global midwater team were excited by the appearance of this fish from the genus *Leptoichthys*. The observation placed this fish at a shallow depth of 900 meters (2,953 feet), when typical observations place this fish squarely in the bathypelagic zone at ~2,000 meters (6,562 feet). *Image courtesy of the NOAA Office of Ocean Exploration and Research, Gulf of Mexico 2017.*



Wreck of a 19th-century copper-clad merchant vessel carrying artifacts including glass bottles, ceramic and porcelain vessels, remnants of a suction bilge pump with cast-iron flywheels, an anchor, and a cast-iron stove. *Image courtesy of the NOAA Office of Ocean Exploration and Research, Gulf of Mexico 2017.*

Mapped more than 26,000 square kilometers of seafloor.

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

- Collected eight rock samples and one sediment sample for use in geochemical composition analysis and age dating to increase the understanding of the formation of these features.
- Conducted several dives to gather geological data to better understand the geological composition and origin of the Florida Escarpment.
- Discovered at least 20 previously unknown chemosynthetic habitats. These included methane seeps (some with visible methane hydrate), asphalt seeps, and brine rivers. Most of these had associated chemosynthetic communities that included large siboglinid tubeworm bushes and extensive mussel beds. There were also many areas of reduced sediments and bacterial mats. Asphaltic and authigenic carbonate outcrops hosting large filter-feeding communities were also observed in geologically active areas.



A dense cluster of *Escarpia* sp. chemosynthetic tubeworms at a cold seep, accompanied by an *Alvinocaris* sp. shrimp and a chaetopterid polychaete waving its pair of feeding palps from its slender bamboo-like tube. *Image courtesy of the NOAA Office of Ocean Exploration and Research, Gulf of Mexico 2017.*

Collected more than 13.1 TB of data, including multibeam, single beam, subbottom, ADCP, XBT, CTD, and dissolved oxygen profiles; surface oceanographic and meteorological sensor informations; and 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 280,000 views via the NOAA Office of Ocean Exploration and Research (OER) YouTube channel. Expedition content on the OER website received over 35,600 views.
- Conducted a successful Facebook live question and answer session that received ~6,000 views while guests responded to over 24 questions.
- Received news and media coverage by various sources including MSN, Daily Mail, Business Insider, IFL Science, and others.
- Conducted six live telepresence interactions with various groups including the Aquarium of the Pacific, Shedd Aquarium, NOAA Gulf Regional Council, University of New Hampshire's Center for Coastal and Ocean Mapping, the Exploratorium, and members of the MIT Media Lab.

For More Information

<http://oceanexplorer.noaa.gov/oceanos/explorations/ex1711/welcome.html>



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