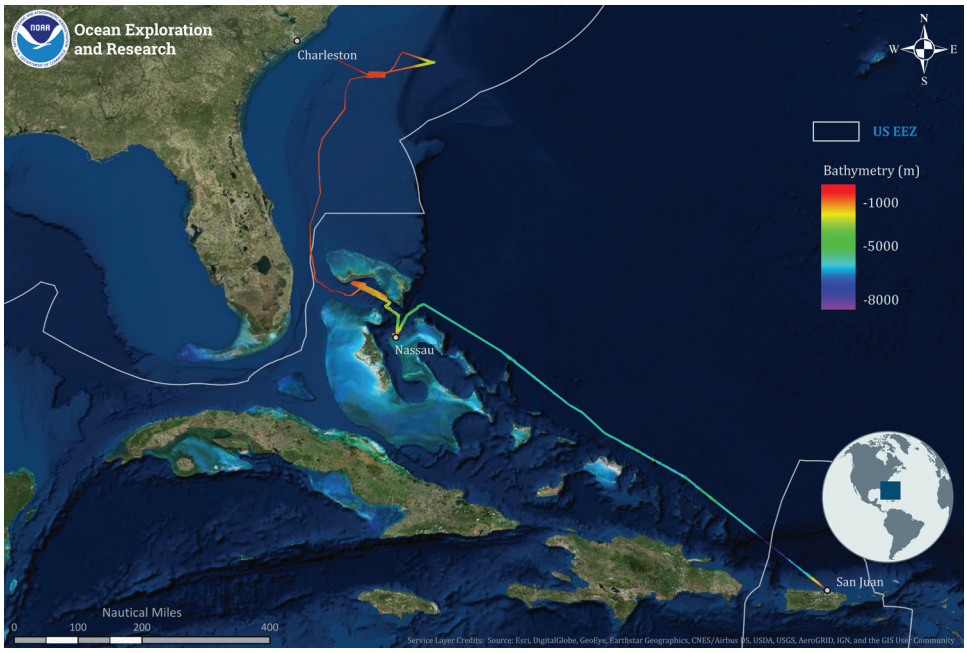
Mapping Deepwater Areas in the Caribbean and South Atlantic Bight (EX1812)

NOAA Ship *Okeanos Explorer*
November 28 - December 14, 2018

Ocean Exploration and Research

ASPIRE

Mapping Deepwater Areas in the Caribbean and South Atlantic Bight was one of several expeditions the NOAA Office of Ocean Exploration and Research (OER) conducted in 2018 as part of the Atlantic Seafloor Partnership for Integrated Research and Exploration (ASPIRE) campaign, a major multi-year, multi-national collaborative field program focused on raising collective knowledge and understanding of the North Atlantic Ocean.

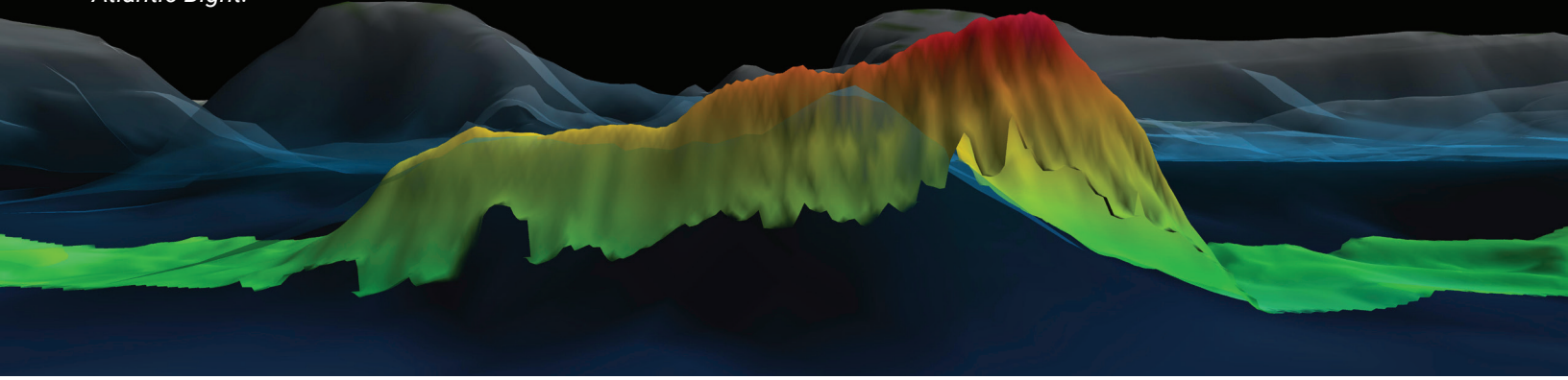


Overview map showing the locations of mapping operations completed during the **Mapping Deepwater Areas in the Caribbean and South Atlantic Bight** expedition. *Map courtesy of the NOAA Office of Ocean Exploration and Research.*

Summary of Accomplishments

Mapping Deepwater Areas in the Caribbean and South Atlantic Bight was a 17-day telepresence-enabled expedition aboard NOAA Ship *Okeanos Explorer* to collect critical information and acquire data on priority exploration areas identified by the ocean management and scientific communities and test innovative new technologies. This expedition involved exploration of a diversity of deepwater features using mapping and remotely operated vehicle (ROV) operations in the Atlantic Ocean from San Juan, Puerto Rico, to Charleston, South Carolina. The team completed a strategic transit to target unmapped deep-sea features from Puerto Rico to the Bahamas. During this expedition, NOAA partnered with the University of Rhode Island, the University of New Hampshire (UNH) Center for Coastal and Ocean Mapping (CCOM), JASCO Applied Sciences, and the U.S. Navy Undersea Warfare Center. Highlights from the expedition are summarized below.

This 2,600 meter (8,350 foot) seamount was mapped during a strategically planned transit from Puerto Rico to the Bahamas and discovered to be nearly 800 meters (2,625 feet) shallower than predicted by the satellite bathymetry. The bathymetry collected during the expedition (in rainbow) overlays the Global Multi-Resolution Topography grid. *Image courtesy of the NOAA Office of Ocean Exploration and Research, Mapping Deepwater Areas in the Caribbean and South Atlantic Bight.*



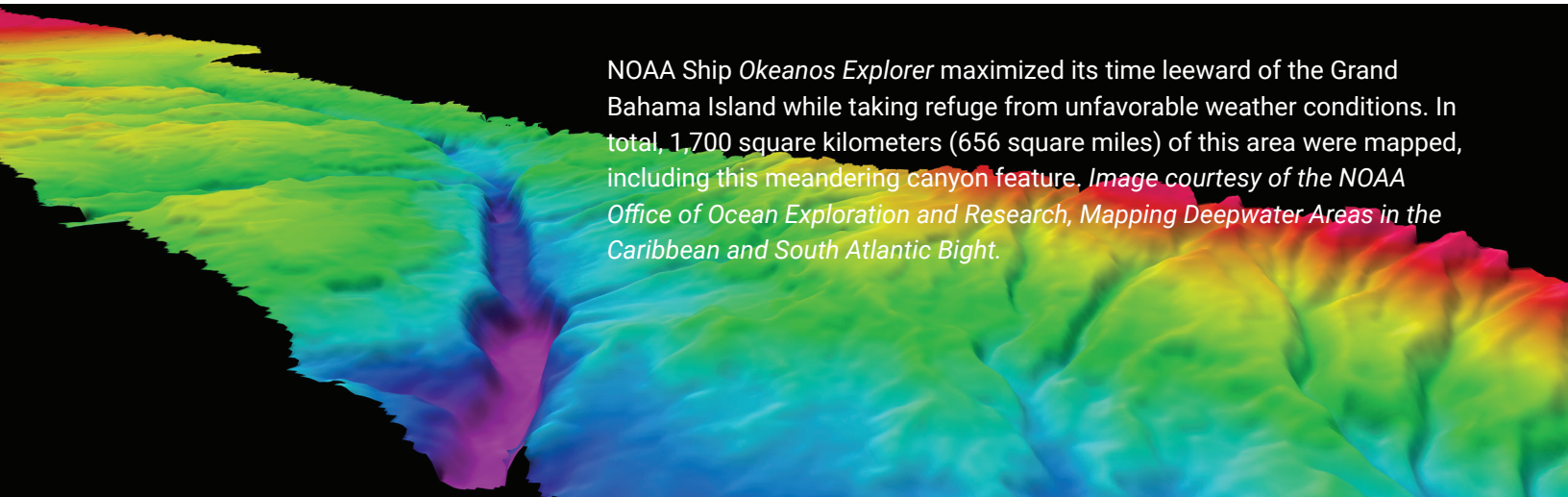
Conducted four successful ROV dives. Data collected during these dives will be used to increase our understanding of deep-sea ecosystem connectivity across the Atlantic basin.

Extended bathymetric mapping coverage in the U.S. Exclusive Economic Zone and international waters in support of Seabed 2030.

- Mapped over 16,900 square kilometers (6,525 square miles) or 1,900 linear kilometers.
- Collected over 60 GB of data including multibeam bathymetry, backscatter, and water column data; sub-bottom data; and split-beam sonar data.

Characterized water column habitats throughout the Atlantic basin using acoustics, visual observations, and emerging technologies.

- Completed one CTD cast and 62 expendable thermograph (XBT) profiles.
- Deployed a JASCO's hydrophone with an Autonomous Multichannel Acoustic Recorders (AMARs) in collaboration with UNH CCOM to better understand the sound signature of multibeam sonar and its effect on the environment.
- Partnered with the NUWC AUTEC Range and hosted three UNH CCOM scientists to characterize the sound signature of the multibeam echosounder, an important technology for high-resolution mapping. This test provided empirical measurements of multibeam echosounder radiation patterns that will improve NOAA's understanding of how these systems are impacted by ocean acoustic uncertainties.
    - The Tongue of the Ocean in the Bahamas was selected as the test location because of its natural characteristics of being a sheltered, flat bottom ocean trench isolated from outside noise. NUWC AUTEC also provided data collected from their fixed hydrophone array in the range for the study.



NOAA Ship *Okeanos Explorer* maximized its time leeward of the Grand Bahama Island while taking refuge from unfavorable weather conditions. In total, 1,700 square kilometers (656 square miles) of this area were mapped, including this meandering canyon feature. *Image courtesy of the NOAA Office of Ocean Exploration and Research, Mapping Deepwater Areas in the Caribbean and South Atlantic Bight.*

Leveraged national and international partnerships to conduct coordinated exploration and mapping of priority high-seas areas of the North Atlantic.

- Collected timely and actionable mapping data in the U.S. Southeast approximately 160 nautical miles east of Savannah, Georgia. This priority area was identified by community stakeholders at the NOAA OER-hosted ASPIRE Science Planning workshop in November 2018.
- Added publically available mapping data to deepwater areas south of Grand Bahama Island in the Bahamas, Dominican Republic, Turks and Caicos, and the U.S. Exclusive Economic Zone.

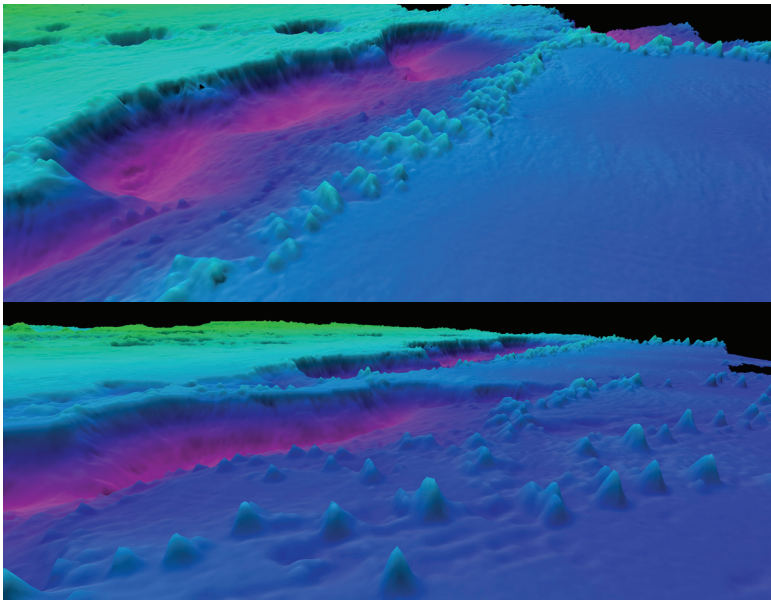
Worked with national and international partners to test innovative technology at sea to further advance the field of ocean exploration.

- Collaborated with the URI 3D Printing Project to test a resin-based 3D printing for the first time at sea. A 3D printed pressure housing was successfully sent to depth of 200 meters.
- Worked with partners to recover the DEEP SEARCH Autonomous Lander for Benthic Experiments (ALBEX) within 48 hours of its premature release from the seafloor. The lander was offloaded in Charleston, South Carolina, and will be redeployed during the 2019 field season.

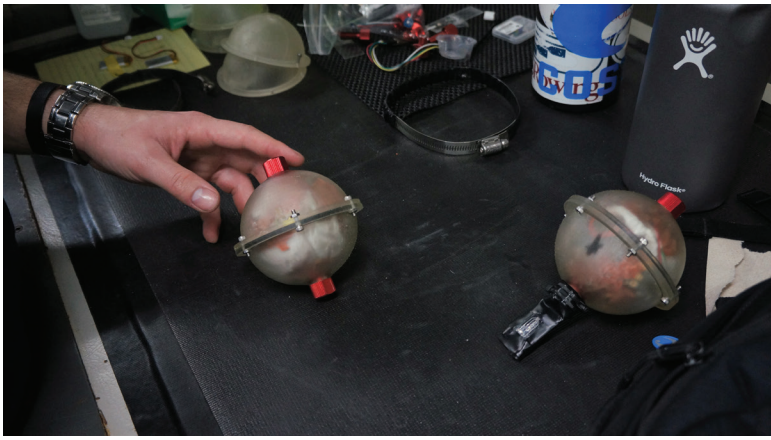
Provided experiences to help train the next generation of ocean explorers.

- Hosted four undergraduate students and one associate professor from URI to test 3D printing applications at sea.
- Hosted three interactions with over 60 individuals from the University of Rhode Island, Newark Charter High School in Delaware, and Garrett High School in Indiana.

Data collected during this expedition will inform initial characterization of the areas visited and includes multibeam, single beam, sub-bottom, ADCP, XBT, CTD, and dissolved oxygen profiles and data from surface oceanographic and meteorological sensors. All data from this expedition will be publicly available through national archives. OceanExplorer.NOAA.gov will provide a direct link to the expedition data archive once available.



Numerous mounded structures were discovered, both lining basins on the eastward side of the ASPIRE priority area and sporadically throughout the area. These structures range from 5 - 30 meters (16 - 98 feet) high and are likely deep-sea coral mounds, as similar features were discovered during previous expeditions in nearby locations. *Image courtesy of the NOAA Office of Ocean Exploration and Research, Mapping Deepwater Areas in the Caribbean and South Atlantic Bight.*



These pressure chambers were printed at sea by the URI team using their 3D printer. They were sent to a depth of 200 meters (656 feet) and successfully recovered intact, without any leaks or structure failures. To the team's knowledge, this is the first documented time this type of device has been printed at sea and then tested at depth. *Image courtesy of the NOAA Office of Ocean Exploration and Research, Mapping Deepwater Areas in the Caribbean and South Atlantic Bight.*

For More Information

OceanExplorer.NOAA.gov/okeanos/explorations/ex1812/welcome.html

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