



**Ocean Exploration  
and Research**

## Ocean Exploration Education Highlights

### August 2016

Welcome to the NOAA Ocean Explorer Education Highlights email. These monthly emails provide you with quick access to ocean exploration-focused, standards-based tips and tools to bring the excitement and science of ocean exploration into your classroom!

### What's the Latest from NOAA Ocean Exploration for Your Classroom?



Often multiple species of invertebrates are found co-occurring on rock ledges and canyon walls. Here a brisingid sea star, an octopus, bivalves, and cup coral are found in close proximity to one another. *Image courtesy of Deepwater Canyons 2013 - Pathways to the Abyss, NOAA-OER/BOEM/USGS.*

### Exploring Carolina Canyons Expedition 2016

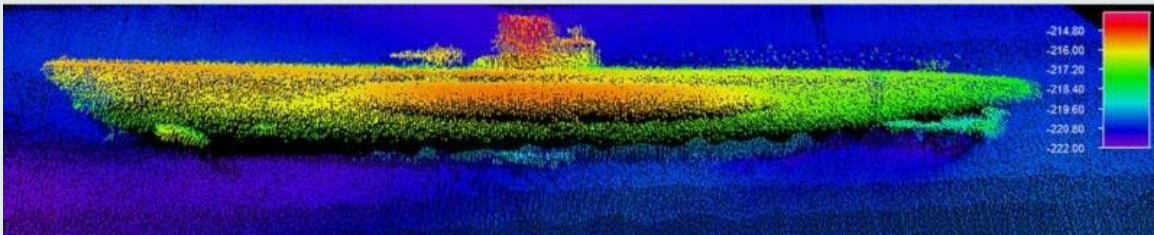
Underwater canyons are striking structures that cut into the continental margin, dropping from hundreds to thousands of meters, connecting the upper continental shelf to the deep sea. These complex features host a high diversity of biological habitats, including deep-sea coral communities and commercially-important fish habitats, but the full extent of their distribution and community structure is still unknown.

From August 24 to September 7, 2016, explorers aboard the [NOAA Ship Pisces](#) will investigate underwater canyons approximately 50 miles off the coast of North Carolina, and expand knowledge gained from previous east coast canyons focused expeditions conducted in more northern regions of the U.S. Atlantic coast. The purpose of this expedition is to investigate the biological and geological features in this area, in particular deep-sea corals and cold seeps.

On August 19, 2016, the following links to the expedition will be live:

[Exploring Carolina Canyons Expedition 2016](#)

[Exploring Carolina Canyons Expedition Education Module](#): This collection includes an Expedition Purpose written for educators, standards-based lessons, a Deep-sea Canyons Theme page, and much more!



High resolution image of the German submarine U-576. This is the only depiction of the site to date.  
Image courtesy of NOAA.

## The Battle of the Atlantic WW II Battlefield Archaeology Expedition

Following America's entry into World War II, German U-boat raiders attacked U.S. merchant ships off the east coast of the United States and sank almost 200 vessels between January and April of 1942 in what is now known as the Battle of the Atlantic. Two U.S. ships were sunk off the coast of North Carolina before the attacking German submarine, U-576, was sunk in a counter attack minutes later. This battle represents one of the most historically significant naval engagements of the Battle of the Atlantic off America's coast.

After several years of searching, in 2014 explorers located the remains of both U-576 and the freighter S.S. *Bluefields* near one another in approximately 230 meters of water, 35 miles offshore. From a base of operation aboard the R/V *Baseline Explorer* the expedition team will explore the final resting place of these vessels in two stages: the first from August 22 to September 6, 2016, and the second from October 27 to November 10, 2016. Explorers will use two human-occupied submersibles and an autonomous underwater vehicle to examine the two wrecks and surrounding battlefield area for their archaeological and biological habitat significance.

On August 19, 2016, the following links to the expedition will be live:

[The Battle of the Atlantic WW II Battlefield Archaeology Expedition](#)

[Battlefield of the Atlantic Expedition Education Module](#): This collection includes an Expedition Purpose written for educators, standards-based lessons, a marine Archaeology theme page, and much more!

## Standards-based Lesson

### The Robot Archaeologist (Grades 9-12)

Earth Science/Mathematics  
NGSS: HS-ETS-2

In this lesson, students design an archaeological survey strategy for an autonomous underwater vehicle (AUV), calculate the expected position of the AUV based on speed and direction of travel, and calculate course correction required to compensate for the set and drift of currents.

Exploring the Submerged New World 2009  
**The Robot Archaeologist**  
(Adapted from the AUWest 2008 Expedition)

**Focus**  
Marine Archaeology/Marine Navigation

**Grade Level**  
9-12 (Earth Science/Mathematics)

**Focus Question**  
What information is needed to program an underwater robot to follow a desired course?

**Learning Objectives**

- Students will be able to design an archaeological survey strategy for an autonomous underwater vehicle (AUV).
- Students will be able to calculate expected position of the AUV based on speed and direction of travel.
- Students will be able to calculate course correction required to compensate for the set and drift of currents.

**Materials**

- Rulers or dividers for measuring distance
- Parallel rules or two drafting triangles for transferring course lines to a compass rose

Dividers  
Parallel rule

This lesson was written for the [Exploring the Submerged New World 2009 expedition](#).

## Image of the Month



Never before seen live, this transparent fish was found at 2,500 meters. Image courtesy of [2016 Deepwater Exploration of the Marianas](#), NOAA-OER.

## First Sighting

"This is just remarkable." That's how Bruce Mundy, fishery biologist with the NOAA National Marine Fisheries Service, Pacific Islands Fisheries Science Center, described seeing live video of this eel-like fish. What makes it so remarkable is the fact that a fish in this family has never been seen live - until now.

Video of the fish was captured during the [2016 Deepwater Exploration of the Marianas expedition](#) on NOAA Ship [Okeanos Explorer](#) to explore the unknown and poorly known deep waters of the [Marianas Trench Marine National Monument](#) and the Commonwealth of the Northern Mariana Islands. Seen while exploring a deep-water ridge feature, the fish measured about 10 centimeters in length. With its transparent, gelatinous skin, which lacked scales, and its highly reduced eyes that lacked pigment, the fish was truly a remarkable - and ghostly - find.

Watch [the fish in action](#) at a depth of 2,500 meters (8,200 feet)!



Operations Officer LTJG Aaron Colohan scans the horizon while on watch. *Image courtesy of NOAA.*



The NOAA Ship *Okeanos Explorer* Education Materials Collection.

## Meet NOAA Ship *Okeanos Explorer* Operations Officer LTJG Aaron Colohan

Aaron Colohan serves multiple roles as a NOAA Corps Officer aboard the NOAA Ship *Okeanos Explorer*. [Here](#) students can read his first-hand description of his

## Upcoming Education Professional Development

Our Fall 2016 [professional development opportunities](#), *Exploring the Deep Ocean with NOAA*, are now listed on our website. Sign up for a full-day onsite professional development at an aquarium or science center near you!

responsibilities and his typical day at sea.

**Note:** This workshop is a combination of the previously offered *Why Do We Explore?* and *How Do We Explore?* workshops.

**We hope that these Exploration Education Highlights will help you focus more of your classroom teaching and learning on the amazing discoveries taking place right here, right now, on our own Planet Ocean! Onward and downward!**

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