

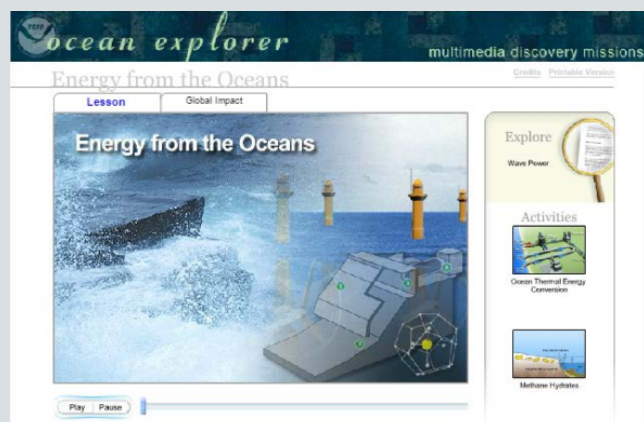


## Ocean Exploration and Research

# Ocean Exploration Education Highlights December 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?



The Ocean Explorer [Multimedia Discovery Missions](#) are a series of 13 interactive multimedia presentations and learning activities that address a wide range of ocean topics.

## Teaching about Energy? What about Energy from the Ocean?

The ocean has long been a source of bounty, supplying mankind with basic needs like food and transportation, and delighting us with its beauty and wonder. Within and beneath the waves lies another vital resource - proven reserves of conventional, non-renewable energy stores, as well as the promise of clean, renewable power generated by the ocean's mechanical and thermal energy.

The [Energy from the Ocean](#) Multimedia Discovery Mission includes a short video lesson describing renewable and non-renewable energy resources from the ocean, a second video on global impact, and three online interactive student activities.

## Standards-based Lesson

### [Oceans of Energy](#) (Grades 7-8)

**NGSS:**

**Performance Expectation MSPS-3-2**


**Disciplinary Core Idea PS3.C**

In this lesson, students describe forms of energy, explain how each form is used by humans, and discuss at least three ways that

energy can be obtained from the ocean.  
Hands-on activity: Students build a micro-hydroelectric generator.

*Note: All lessons are written to support the [NGSS](#) and the [Ocean Literacy Essential Principles and Fundamental Concepts](#).*

The NOAA Ship Okeanos Explorer Education Materials Collection [oceanexplorer.noaa.gov](http://oceanexplorer.noaa.gov)



**Section 4:**  
**Key Topic – Energy**

### Oceans of Energy

**Focus**  
Ocean energy

**Grade Level**  
7-8 (Physical Science/Earth Science)

**Focus Question**  
What forms of energy are found in the ocean, and how might these be used by humans?

**Learning Objectives**

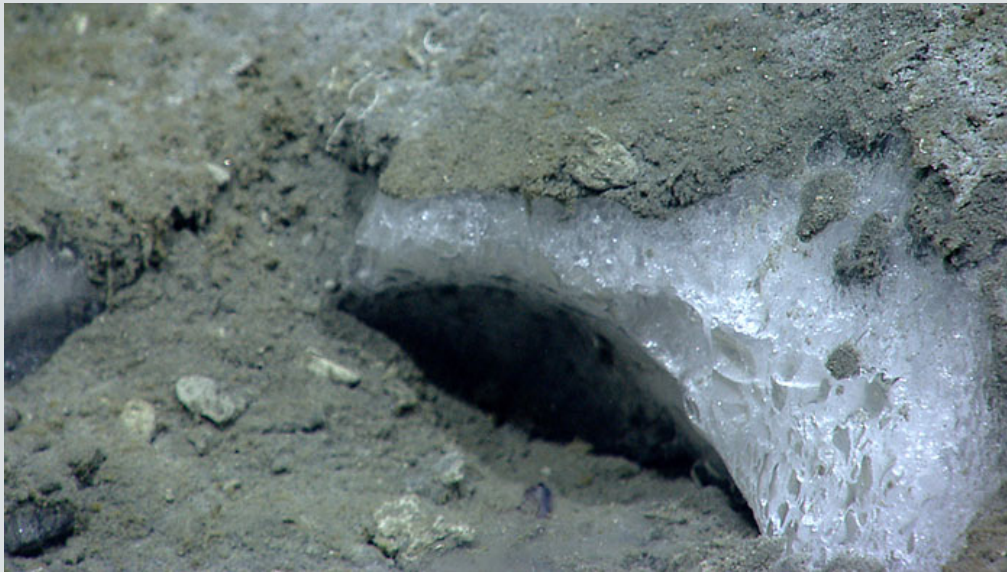
- Students will describe forms of energy.
- Students will explain how different forms of energy are used by humans.
- Students will explain at least three ways that energy can be obtained from the ocean.

**Materials**

- Copies of *Ocean Energy Investigation Guide*, one for each student group
- Copies of the *Micro-Hydro Electric Generators Construction Guide*, one for each student group
- Materials for constructing Micro-Hydro Electric Generators (For each student group):
  - 3.8 liter (1 gal) plastic jug (a rectangular jug used for cooking oil, orange juice

NOAA Ship Okeanos Explorer: America's Ship for Ocean Exploration.  
Image credit: NOAA. For more information, see the following Web site:  
<http://oceanexplorer.noaa.gov/okeanos/welcome.html>

## Image of the Month



[Close-up of methane hydrate](#) observed at a depth of 1,055 meters, near where bubble plumes were detected in previous sonar data.  
*Image courtesy of NOAA Okeanos Explorer Program, 2013 Northeast U.S. Canyons Expedition.*

Archaea known as methanogenic Archaea. These Archaea obtain energy by anaerobic metabolism through which they break down the organic material contained in once-living plants and animals. When this process takes place in deep ocean sediments, methane molecules are surrounded by water molecules, and conditions of low temperature and high pressure allow stable ice-like methane hydrates to form.

Watch this [highlight video of the discovery of a methane seep site](#) and its associated chemosynthetic communities during the [Northeast U.S. Canyons Expedition 2013](#) and explore this essay, [Methane in the Ocean](#) describing methane production in the deep sea.

## Methane Hydrates in the Deep Sea

Methane hydrate is a type of clathrate, a chemical structure in which the molecules of one material (water, in this case) form an open lattice that encloses molecules of another material (methane) without actually forming chemical bonds between the two materials. Methane is produced in many environments by a group of



Acoustic technicians, Jamie Smith and Jennie Morgan, bake sugar and gingerbread cookies for the holidays. With no cookie cutters on board the ship, the shapes are cut by hand. *Image courtesy of UCSB, U of SC, NOAA, WHOI.*

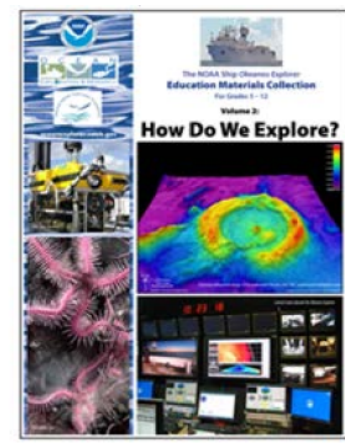
## Holidays at Sea

"We could not be the people we are without our life at sea."

In this essay, [Away for the Holidays](#), from [NOAA OE Galapagos: Where Ridge Meets Hotspot 2005](#), Able-bodied Seaman Brian Clampitt tells of the trials of being at sea during the holiday season.

*"No event out here puts the loss of time together into focus like a big, family oriented holiday. But, for each of us that choose to go to sea, there is an understanding between our loved ones and us."*

And in this essay, [Christmas at Sea](#), Expedition Coordinator Kelley Elliott tells of crew festivities on board an exploration vessel that help to make the holidays away from home special.



The *Exploring the Deep Ocean with NOAA* educator professional development workshop combines background and activities from the [NOAA Ship Okeanos Explorer Education Materials Collection](#), [Why Do We Explore?](#) and [How Do We Explore?](#)

## Upcoming Education Professional Development

Our Spring 2017 [professional development schedule](#) for *Exploring the Deep Ocean with NOAA* is now posted on our website. Sign up for a full-day onsite professional development at an aquarium or science center near you!

**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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