



## Educator Resource List

### Life Beyond Light: Chemosynthetic Communities of the Deep Ocean Hydrothermal Vents & Cold Seeps

Below are all of the lessons and resources covered within the Life Beyond Light educator professional development workshop. **The main web page for each lesson provides links to educator guides, student worksheets, teaching slides, demonstration videos and more.**

## Chemosynthesis

### Lessons

- **Fueling Life on Earth: Chemosynthesis vs Photosynthesis (HS Lesson)**

<https://oceanexplorer.noaa.gov/edu/themes/vents-and-volcanoes/lessons/fueling-life.html>

- **Educator Guide:**

<https://oceanexplorer.noaa.gov/edu/materials/educator-guide-fueling-life-on-earth.pdf>

- **Student Worksheet:**

<https://oceanexplorer.noaa.gov/edu/materials/student-worksheet-fueling-life-on-earth.pdf>

## Hydrothermal Vents

### Lessons

- **Investigation: How Black Smoker Vent Chimneys Form (MS Lesson)**

<https://oceanexplorer.noaa.gov/edu/themes/vents-and-volcanoes/lessons/black-smoker.html>

- **Educator Guide:**

<https://oceanexplorer.noaa.gov/edu/materials/vent-chimney-formation-investigation.pdf>

- **Student Worksheet:**

<https://oceanexplorer.noaa.gov/edu/materials/vent-chimney-formation-student-worksheet.pdf>

- **Vent Formation Demo Video:**

<https://oceanexplorer.noaa.gov/edu/themes/vents-and-volcanoes/lessons/black-smoker.html>

- **Investigation: Life on a Hydrothermal Vent (HS Lesson)**

<https://oceanexplorer.noaa.gov/edu/themes/vents-and-volcanoes/lessons/life-hydrothermal-vent.html>

- **Educator Guide:**

<https://oceanexplorer.noaa.gov/edu/materials/life-on-hydrothermal-vent-investigation.pdf>

### Fact Sheets (FS)

- **Chemosynthesis FS**

- **English:** <https://oceanexplorer.noaa.gov/edu/materials/chemosynthesis-fact-sheet.pdf>

- **Spanish:** <https://oceanexplorer.noaa.gov/edu/materials/chemosynthesis-fact-sheet-ESP.pdf>

- **Hydrothermal Vents FS**

- **English:** <https://oceanexplorer.noaa.gov/edu/materials/hydrothermal-vents-fact-sheet.pdf>

- **Spanish:** <https://oceanexplorer.noaa.gov/edu/materials/hydrothermal-vents-fact-sheet-ESP.pdf>

## Video Overview

- **Deep-Sea Dialogues: Hydrothermal Vents**

<https://oceanexplorer.noaa.gov/edu/multimedia-resources/dsd/media/hydrothermal-vents-640x360.mp4?640>

- **Deep Ocean Bites: short excerpts from the above video - Microbes and Chemosynthesis and Careers in Vent Science** <https://oceanexplorer.noaa.gov/edu/multimedia-resources/deep-ocean-bites/hydrothermal-vents.html>

## Cold Seeps

### Lessons

- **Methane Hydrates of the Deep Sea (MS Lesson)**

<https://oceanexplorer.noaa.gov/edu/themes/cold-seeps/lessons/methane-hydrate-model.html>

- **Educator Guide:** <https://oceanexplorer.noaa.gov/edu/materials/activity-methane-hydrate-model.pdf>
- **Student Worksheet:**  
<https://oceanexplorer.noaa.gov/edu/materials/activity-methane-hydrate-model-student-worksheet.pdf>

- **Investigation: Fire Ice in the Deep Sea (MS Lesson)**

<https://oceanexplorer.noaa.gov/edu/themes/cold-seeps/lessons/fire-ice-in-deep-sea.html>

- **Educator Guide**  
<https://oceanexplorer.noaa.gov/edu/materials/student-investigation-fire-ice-in-deep-sea.pdf>
- **Student Worksheet**  
<https://oceanexplorer.noaa.gov/edu/materials/fire-ice-in-deep-sea-student-worksheet.pdf>

- **Investigation: Methane Ice Worms (HS Lesson)**

<https://oceanexplorer.noaa.gov/edu/themes/cold-seeps/lessons/methane-ice-worms.html>

- **Educator Guide**  
<https://oceanexplorer.noaa.gov/edu/materials/student-investigation-methane-ice-worms.pdf>
- **Student Worksheet**  
<https://oceanexplorer.noaa.gov/edu/materials/student-worksheet-methane-ice-worms.pdf>

### Fact Sheets (FS)

- **Chemosynthesis FS**

- **English:** <https://oceanexplorer.noaa.gov/edu/materials/chemosynthesis-fact-sheet.pdf>
- **Spanish:** <https://oceanexplorer.noaa.gov/edu/materials/chemosynthesis-fact-sheet-ESP.pdf>
- **Portuguese:**  
<https://oceanexplorer.noaa.gov/edu/materials/portugues-quimiosintese-ficha-technica.pdf>

- **Cold Seeps FS**

- **English:** <https://oceanexplorer.noaa.gov/edu/materials/what-are-cold-seeps-fact-sheet.pdf>
- **Spanish:** <https://oceanexplorer.noaa.gov/edu/materials/what-are-cold-seeps-fact-sheet-ESP.pdf>

- **Cold Seep Communities FS**

- **English:** <https://oceanexplorer.noaa.gov/edu/materials/cold-seep-communities-fact-sheet.pdf>
- **Spanish:** <https://oceanexplorer.noaa.gov/edu/materials/chemosynthesis-fact-sheet-ESP.pdf>

## Video Overview

- **Deep-Sea Dialogues: Cold Seeps**

<https://oceanexplorer.noaa.gov/edu/multimedia-resources/dsd/media/cold-seeps-640x360.mp4?640>

## Additional Resources

- **What is the difference between hydrothermal vents and cold seeps? (Ocean Fact):**  
<https://oceanexplorer.noaa.gov/facts/seeps-vents.html>
- **Making Sense of Deep-Sea Phenomena (Background):**  
<https://oceanexplorer.noaa.gov/edu/materials/NOAA-NSTA-sensemaking-phenomenon.pdf>
- **Ocean Literacy:** <https://www.marine-ed.org/ocean-literacy/overview>
  - **Ocean Literacy Guide:** <https://www.marine-ed.org/ocean-literacy/guide>
  - **Ocean Literacy Handbook:** <https://www.marine-ed.org/ocean-literacy/handbook>
- **NOAA Ocean Exploration:** <https://oceanexplorer.noaa.gov/edu/themes/welcome.html>
  - **Ocean Exploration Education Fact Sheets:**  
<https://oceanexplorer.noaa.gov/edu/materials/fact-sheets.html>
  - **Deep-Sea Dialogues:** <https://oceanexplorer.noaa.gov/edu/multimedia-resources/dsd/dsd.html>
  - **Deep Dive into Cold Seeps (Interview with an Expert):**  
<https://www.youtube.com/playlist?list=PL3MLzt5mNjuku8N8kYjRxW60VuA22EmZJ>
- **Deep Ocean Education Project (website):** <https://deepoceaneducation.org/>