What is the difference between hydrothermal vents and cold seeps?

Instructions

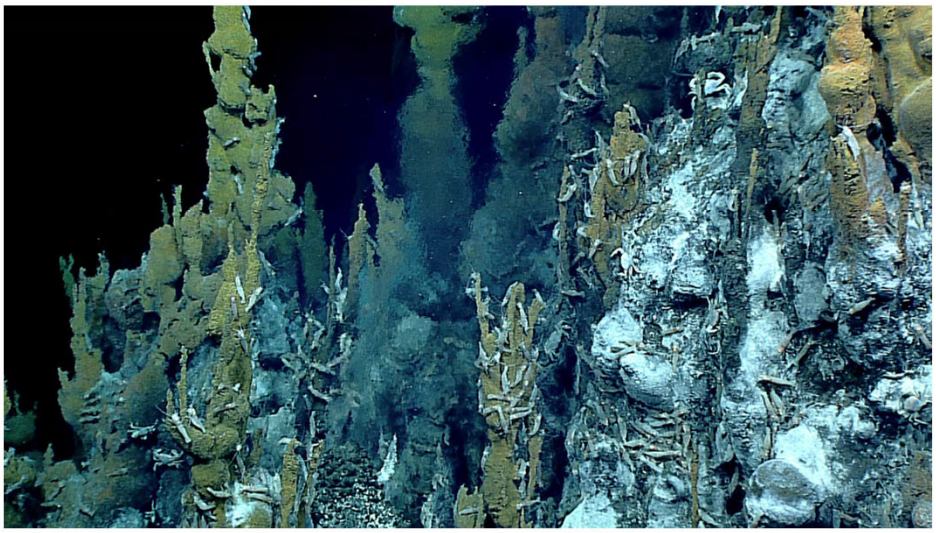
Hydrothermal vents and **cold seeps** are both deep-sea ecosystems that are fueled by chemosynthesis. Despite this major similarity, vents and seep ecosystems each have unique characteristics that make these ecosystems distinctly different.

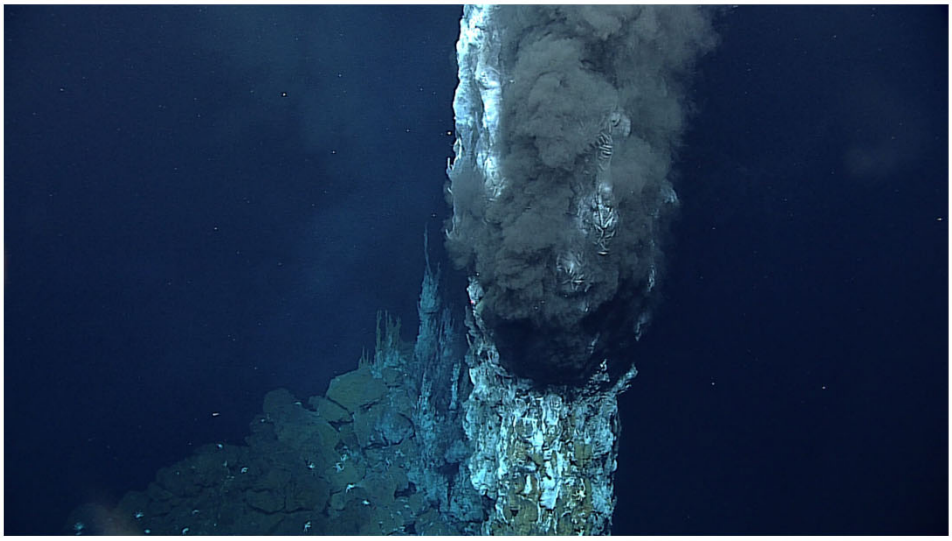
1. **Read** through the activity cards.

1. **Sort** the characteristics into two columns based on the ecosystem it belongs to:
   a. Hydrothermal Vents
   b. Cold Seeps

1. **Check** your answers with your teacher.

HYDROTHERMAL VENTS





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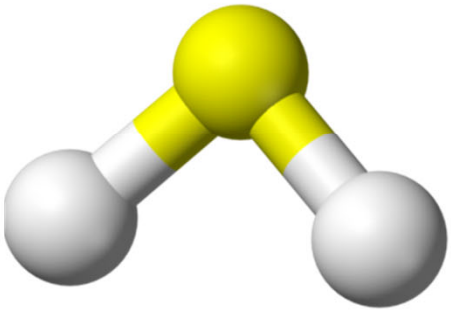

Hydrogen Sulfide

H_2S

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Driven by volcanism

Volatile and short-lived

Organisms grow quickly here

Openings on the ocean floor from which magma-heated, mineral-rich water emerges, often forming large chimneys.

Highly acidic fluids are of extremely high temperatures (> 400°C/750°F)

Emit gases comprised of hydrocarbons and hydrogen sulfide

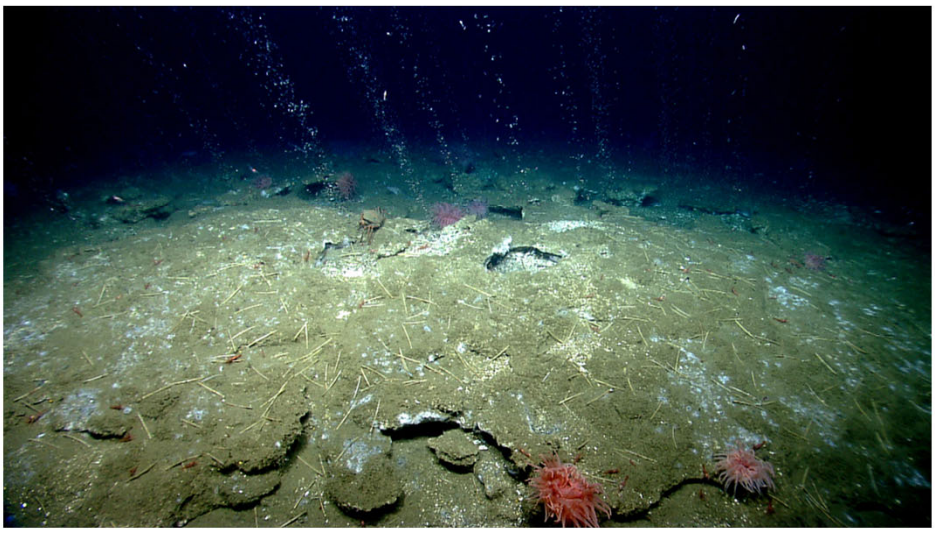
Rich in minerals that precipitate out forming "white and black smokers"

Occur at tectonically active areas like the mid-ocean ridges and the Pacific Ring of Fire

Organisms that thrive here include giant tube worms (*Riftia pachyptila*)

[fastest growing marine invertebrates on Earth - a little less than 1 m (~3 ft) in a year!]

COLD SEEPS



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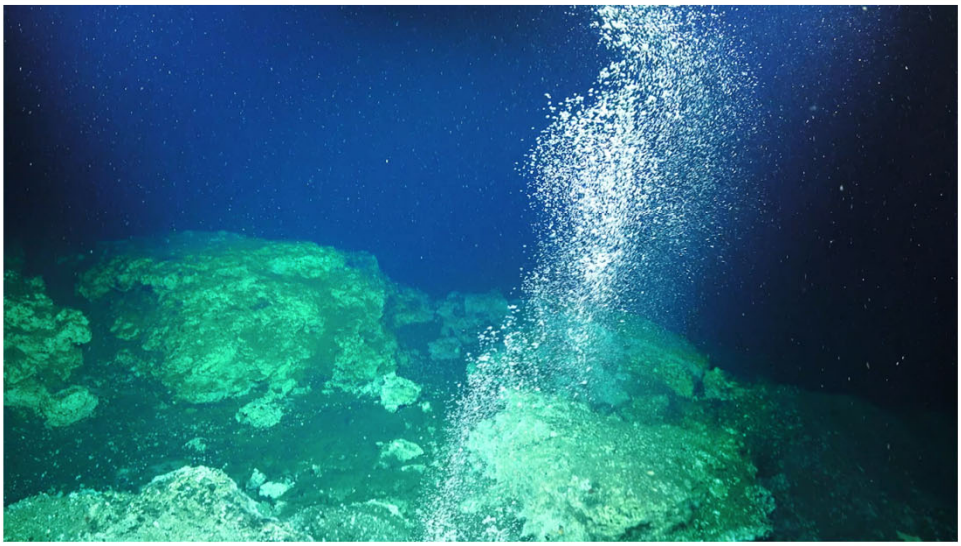

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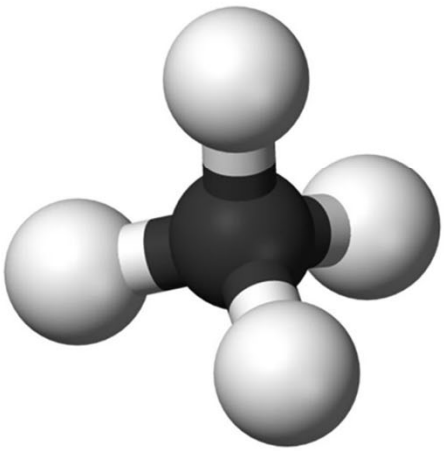


Methane
CH_4

Relatively stable and long-lasting

Organisms here grow slowly and can be extremely long-lived

Fluid temperatures are similar to surrounding seawater

Emit gases and fluids including methane, oil, and hydrogen sulfides

Located where hydrocarbon-rich fluid comes up from below the seafloor, often as methane (CH_4) or hydrogen sulfide (H_2S).

Occur at tectonically active areas like:

- **Cascadia Margin in Eastern Pacific**

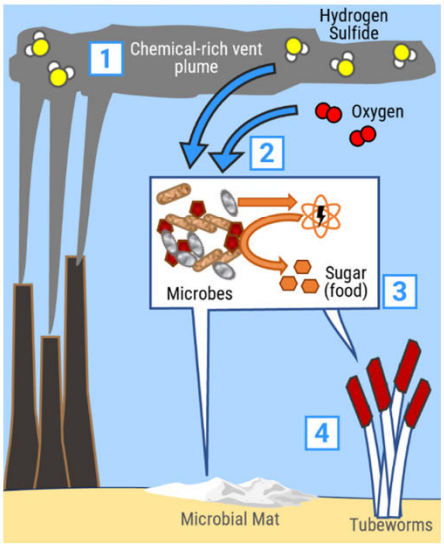
  And/Or

- **Along passive (inactive) continental margins**
  - **along U.S. Atlantic coast and Gulf of America**

- **Organisms that thrive here include slow-growing tubeworms, *Lamellibrachia luymesi***
  - **Those found in the Gulf of America were over 200 years old and about 2 meters (6 feet) long**

Optional Diagrams

Use to scaffold activity or if students need more visuals.



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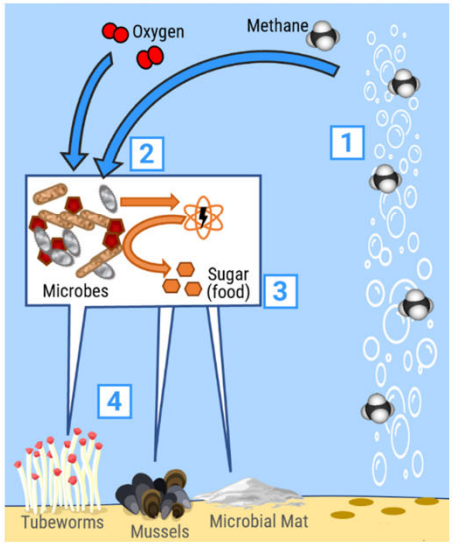

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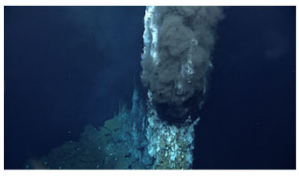
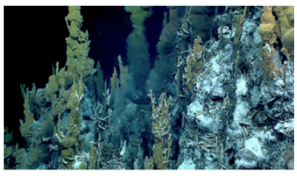
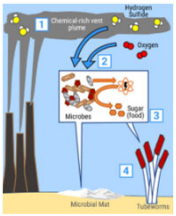
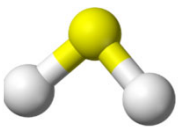
ANSWER KEY

Hydrothermal Vents

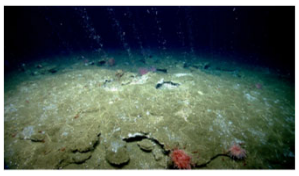


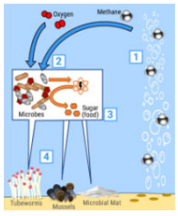


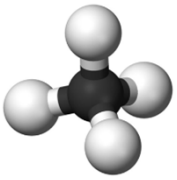


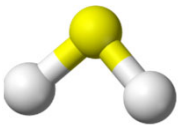


Cold Seeps









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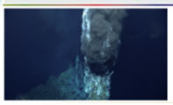
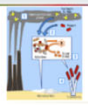
Answer Key - Hydrothermal Vents

HYDROTHERMAL VENTS 1	 2	 3	 Hydrogen Sulfide 4	Openings on the ocean floor from which magma-heated, mineral-rich water emerges, often forming large chimneys. 5
Driven by volcanism 6	Volatile and short-lived 7	Highly acidic fluids are of extremely high temperatures (> 400°C/750°F) 8	Emit gases comprised of hydrocarbons and hydrogen sulfide 9	Rich in minerals that precipitate out forming "white and black smokers" 10
Organisms grow quickly here 11	Occur at tectonically active areas like the mid-ocean ridges and the Pacific Ring of Fire 12	Organisms that thrive here include giant tube worms (*Riftia pachyptila*) [fastest growing marine invertebrates on Earth - a little less than 1 m (~3 ft) in a year!] 13	 14	

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Answer Key - Cold Seeps

COLD SEEPS 1	 2	 3	 Methane 4	Located where hydrocarbon-rich fluid comes up from below the seafloor, often as methane (CH_4) or hydrogen sulfide (H_2S). 5
Relatively stable and long-lasting 6	Fluid temperatures are similar to surrounding seawater 7	Emit gases and fluids including methane, oil, and hydrogen sulfides 8	Organisms here grow slowly and can be extremely long-lived 9	Occur at tectonically active areas like: • Cascadia Margin in Eastern Pacific And/Or • Along passive (inactive) continental margins ○ along U.S. Atlantic coast and Gulf of Mexico 10
• Organisms that thrive here include slow-growing tubeworms, *Lamellibrachia luymesi* ○ Those found in the Gulf of Mexico were over 200 years old and about 2 meters (6 feet) long 11	 12	add HS		

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ANSWER KEY

Hydrothermal Vents

Hydrothermal vents are openings on the ocean floor from which magma-heated, mineral-rich water emerges, often forming large chimneys.

- Driven by volcanism; volatile and short-lived
- Highly acidic fluids are of extremely high temperatures (> 400°C/750°F)
- Emit gases comprised of hydrocarbons and hydrogen sulfide
- Rich in minerals that precipitate out forming “white and black smokers”
- Organisms here grow quickly
- Occur at tectonically active areas like the mid-ocean ridges and the Pacific Ring of Fire
- Organisms that thrive at vent sites include giant tube worms (Riftia pachyptila), the fastest growing marine invertebrates on Earth [a little less than 1 meter (~3 feet) in a year]

Cold Seeps

Cold (or marine) seeps are locations where hydrocarbon-rich fluid seeps up from below the seafloor, often as methane or hydrogen sulfide.

- Relatively stable and long-lasting
- Fluid temperatures are similar to surrounding seawater
- Emit gases and fluids including methane, oil, and hydrogen sulfides
- Organisms here grow slowly and can be extremely long-lived
- Occur at tectonically active areas like the Cascadia Margin in the Eastern Pacific, and along passive (inactive) continental margins, like along the U.S. Atlantic coast and the Gulf of Mexico
- Organisms that thrive at seep sites include slow-growing tubeworms, Lamellibrachia luymesi; those found at a seep site in the Gulf of Mexico were over 200 years old and about 2 meters (6 feet) long