NO PREP

Submarine Canyons and Turbidity Currents

Includes: Student reading, case study, differentiated questions, teacher key

Name: Period: Date:

Submarine Canyons and Turbidity Currents

What Are Submarine Canyons?

The edges of continents are not smooth slopes into the ocean. Instead, they are cut by massive valleys called submarine canyons, which resemble the canyons we see on land but are found beneath the sea. These features are carved into the continental shelf and continental slope, often beginning near the mouths of large rivers. The Hudson Canyon off the coast of New York and the Monterey Canyon off California are two

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Turbidity Currents: Underwater Avalanches

One of the most powerful forces shaping submarine canyons is the turbidity current. A turbidity current is a fast-moving flow of water mixed with sand, mud, and silt that rushes down the slope of a canyon, similar to an underwater avalanche. Triggered by storms, earthquakes, or sudden sediment buildup, these currents can travel at incredible speeds, eroding canyon walls and transporting enormous amounts of material into the deep sea. When turbidity currents slow down, the sediments they carry settle in layers on the abyssal plains. These deposits, called turbidites, provide scientists with a record of past underwater landslides and even major earthquakes. Because turbidity currents can also damage underwater communication cables, they are important not just for geology but also for modern infrastructure.

Submarine Canyons and Marine Life

Beyond their geological importance, submarine canyons also support marine ecosystems. Their steep walls create habitats for corals and sponges, while the flow of nutrients through canyons attracts fish and other sea life. Some canyons act as feeding grounds for whales and migratory species. Because of their ecological value, many submarine canyons are now being studied for conservation. Canyons also remind us how connected land and sea are. River sediments that begin on land can eventually travel through these underwater valleys to the deep ocean, storing information about Earth's climate and environment along the way.

Key Information: Table: Submarine Canyons and Turbidity Currents

Feature	Description	Example
Submarine canyon	Steep-sided valley on continental slope	Monterey Canyon
Turbidity current	Underwater avalanche of sediment and water	Grand Banks, 1929
Turbidites	Layered deposits left by turbidity currents	Found on abyssal plains
Continental rise	Sediment buildup at slope base	Atlantic margin
Cable damage	Result of powerful underwater currents	Transatlantic cables

Case Study: The 1929 Grand Banks Earthquake

In November 1929, an earthquake struck off the coast of Newfoundland, Canada, triggering one of the most famous turbidity currents ever recorded. The quake caused a massive underwater landslide that sent a turbidity current racing down submarine canyons at estimated speeds of over 60 kilometers per hour. Along its path, the current snapped 12 transatlantic communication cables, cutting off phone and telegraph service between North America and Europe. Scientists later studied the timing of these cable breaks to reconstruct how fast and far the current traveled. In addition to the cable damage, the earthquake generated a tsunami that devastated coastal communities, killing more than two dozen people. The Grand Banks event showed how powerful turbidity currents could be and highlighted their importance in both natural hazards and human infrastructure.

1. How did the 1929 Grand Banks event demonstrate the power of turbidity currents?

_____

_____

2. What impact did the Grand Banks earthquake have on human infrastructure?

_____

_____

Multiple Choice

1. What is a turbidity current?

    a) A slow ocean current that flows along the abyssal plain

    b) A tidal current caused by storms

    c) An underwater avalanche of sediment and water

    d) A rising flow of hot water near vents

2. What evidence helped scientists study the 1929 Grand Banks turbidity current?

a) Fossilized turbidites from deep ocean sediments

b) Broken communication cables

c) Deep-sea drilling cores

d) Coral reef collapse

3. Which feature is created by sediment carried through submarine canyons?

a) Continental rise

b) Continental slope

c) Mid-ocean ridge

d) Rift valley

Matching

Write the letter of the correct definition on the line next to each term.

Term	Definition
1. ___ Submarine canyon	A) Event off Newfoundland in 1929
2. ___ Turbidity current	B) Deposits from underwater avalanches
3. ___ Turbidites	C) Steep-sided valley on continental slope
4. ___ Grand Banks event	D) Area of accumulated sediment at slope base
5. ___ Continental rise	E) Sediment flow damaging cables

Fill-in-the-Blank

1. A _____ current is a fast-moving flow of water and sediment that shapes submarine canyons.

2. The 1929 _____ Banks earthquake triggered a massive turbidity current.

3. The deposits left by turbidity currents are called _____.

Short Answer

Answer each question in 2-4 complete sentences.

1. Why are submarine canyons important for sediment transport?

2. How do turbidity currents affect human activities in the ocean?

3. Why are submarine canyons valuable for marine ecosystems?