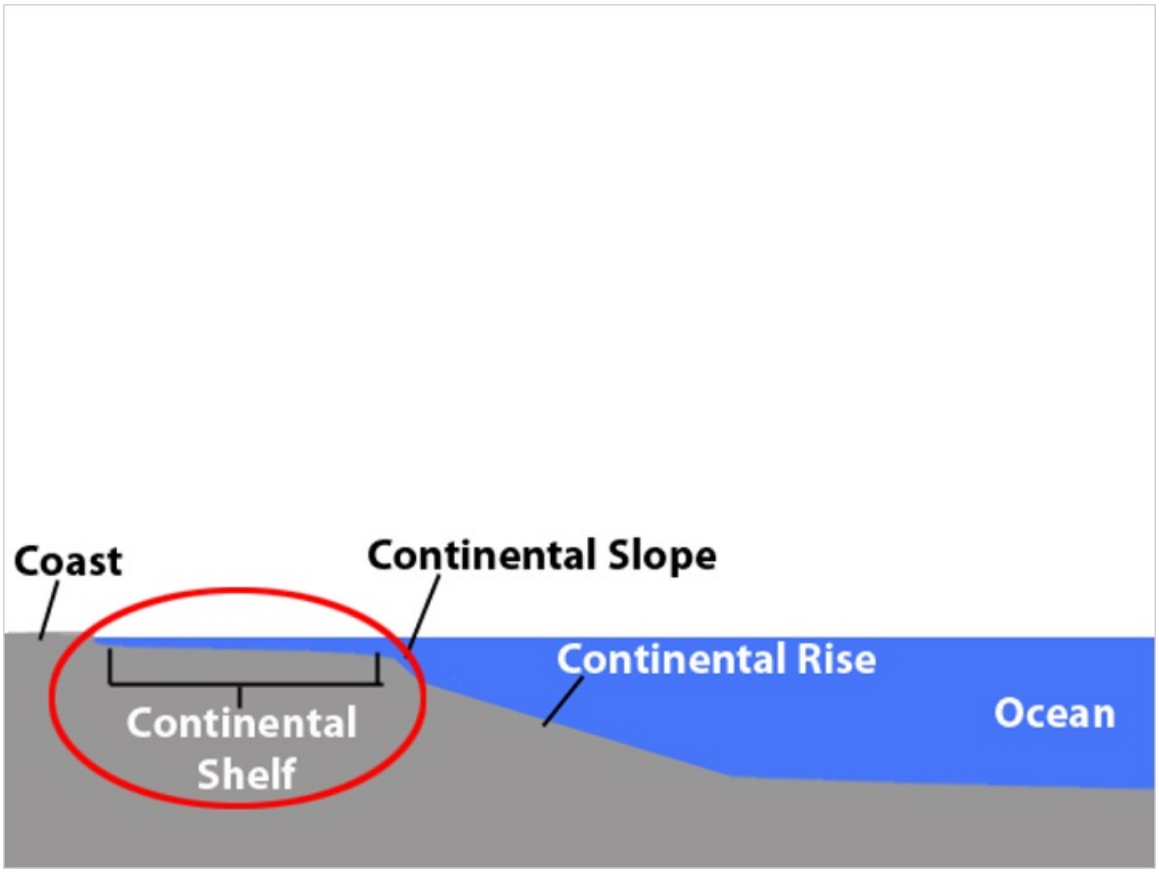
# Module 5: Sedimentation
## Topic 2 Content: Sedimentation of the Continental Shelf Notes




Since the continental shelf is the place where the world's rivers empty into the ocean, as you might expect, most of the sediment you will find on the continental shelf is deposited by these rivers. The process of sedimentation at the mouth of a river, which often forms a river delta, can be somewhat predictable. However, it is not always easy to predict what you will find along the edge of the continents, due to the unique location and various forces acting upon sediments in these areas.

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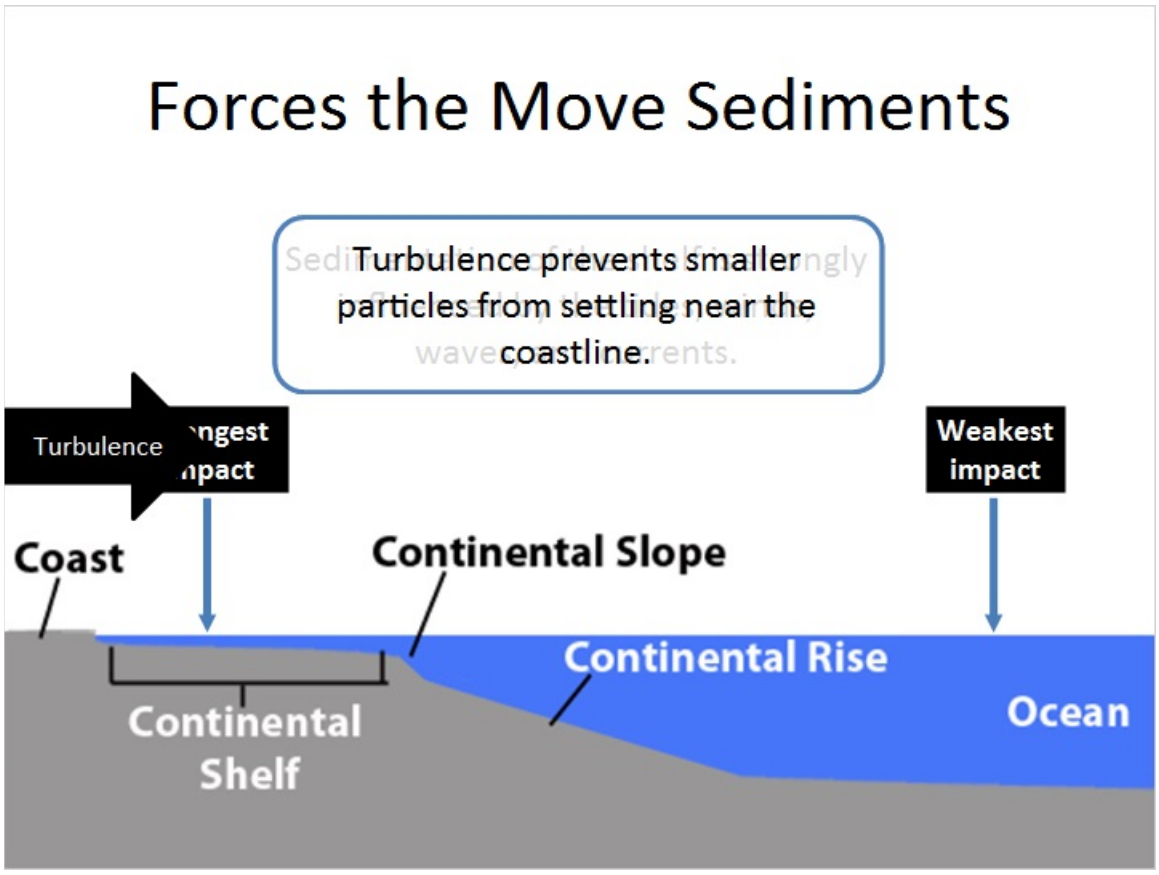
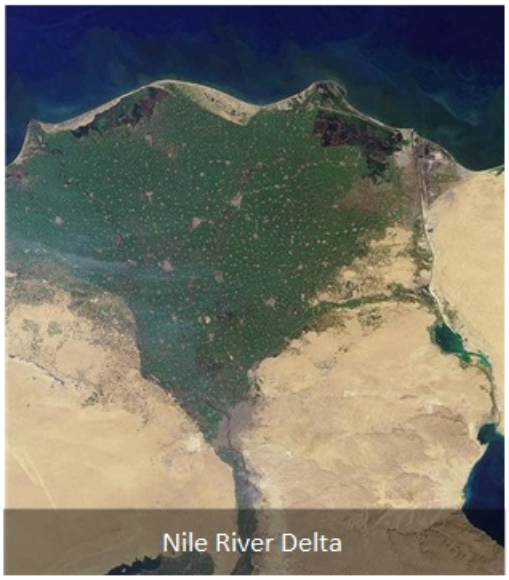



Ocean tides, waves, currents, and wind influence the sedimentation process, especially near the continental shelf. As you move further away from the shore and into the deep ocean, these forces have a much more limited effect on sedimentation.

Turbulence, or the chaotic mixing of water layers, has a strong impact on small particles near the coastline. As particles enter the ocean from rivers and other sources, turbulence prevents small particles from settling and transports them seaward, where they are eventually deposited in much deeper waters. If you explore near the coastline, you will find larger sediments closer to the bottom of the ocean. The size of these sediments decreases as you dig deeper into the sediment layers.

# Location Determines Sedimentation Rate

- Rates vary depending on location
- Sedimentation takes place faster at continental shelf than deep ocean
- Sedimentation slows down when too much biogenous sediment mixes with terrigenous sediment




Rates of sedimentation on the shelf vary greatly depending upon location, but compared to the deep ocean, sedimentation takes place much more quickly near the continental shelf. Each coastline has a different amount of sedimentation based on many factors, such as how many rivers empty into the ocean, the location of estuaries, and the amount of biological productivity. For example, five rivers of about the same size and speed will deposit more sediment into the ocean than one river of equal size and speed.

This image of the Nile River Delta in Egypt shows how one large river can have a massive impact, both on the land surrounding the mouth of the river, as well as the Mediterranean Ocean where it empties. Notice the brown dust off of the coast that is made of sediment.

Rates of sedimentation can be influenced by other factors as well. For example, if too much biogenous sediment from biological activity mixes with terrigenous sediment, the sedimentation rate slows down considerably.

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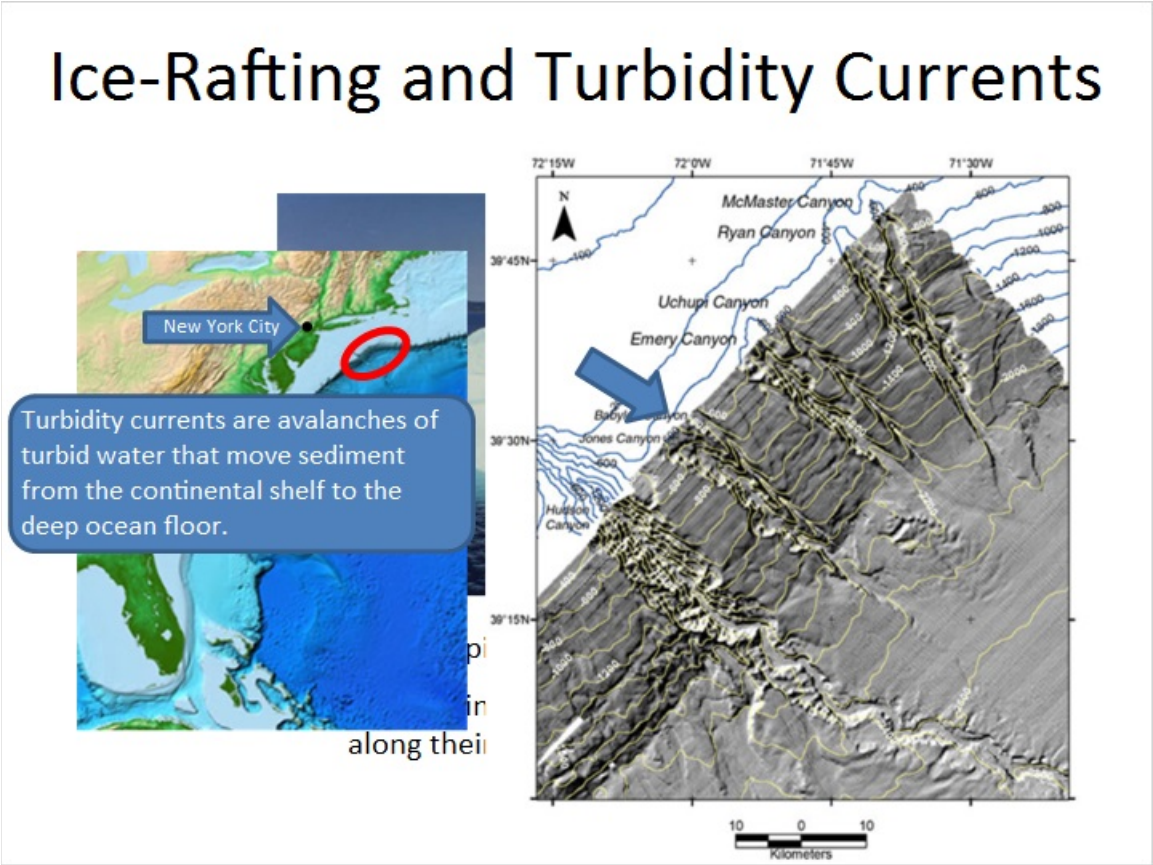
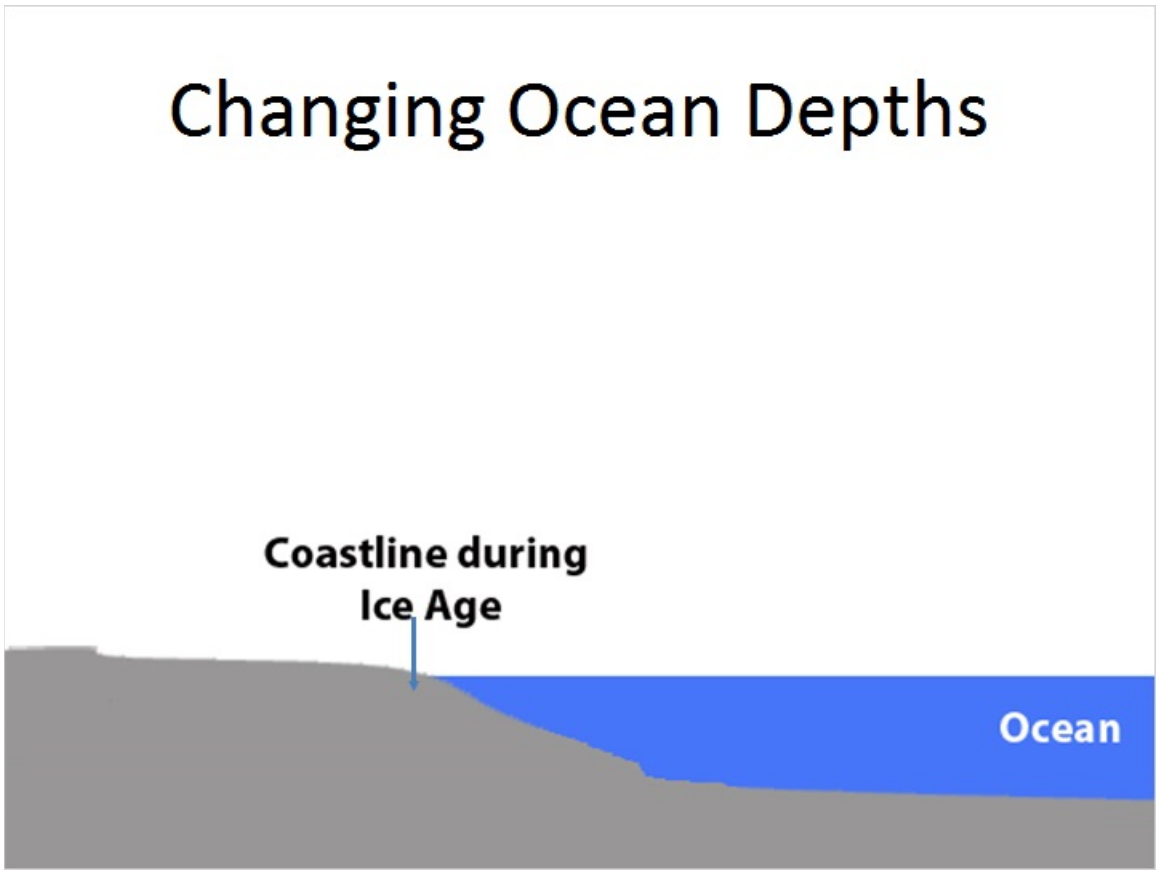



Sometimes, oceanographers find sediments on the deep ocean floor that they would expect to find on the continental shelf. Two forces that might have transported the sediments to deeper waters are icebergs and turbidity currents.

As icebergs expand, they pick up all sizes of sediment and even some rocks that are too large to be classified as sediment. Some of these icebergs end up falling into the ocean and floating off to distant places. As they melt, they drop any sediment they are carrying along the way. This process is called ice rafting. There is no way to predict where the iceberg will travel, so these sediments can end up almost anywhere along the ocean floor.

Turbidity currents work like giant avalanches of snow. When water is turbid, it contains lots of sediments. Turbidity currents are avalanches of turbid water that move sediments from the continental shelf to the deep ocean floor. In the process, turbidity currents carve out submarine canyons, some as large as the Grand Canyon.

This image shows a series of submarine canyons near New York City that were carved out by turbidity currents. Oceanographers can expect to find larger sediments at the bottom of these canyons than they would in the surrounding deep ocean floor.




Only 15,000 years ago during the Ice Age, glaciers covered much of North America and Eurasia. With so much water held in a frozen state, the sea level was much lower than it is today. This brought the coastlines on the continents closer to the deep ocean floor.

In many parts of the ocean floor, scientists have found coarse grained sediment mixed with fine grained sediment. These larger sediments, known as relict sediment, were deposited when these areas were near the coastline. As the Ice Age ended and the glaciers melted, the sea level rose much higher. When scientists find relict sediment, this is evidence that the coastline of the ocean used to be near these deposits