


## Activity 1.5

# Ocean basin features

Early explorers learned (often the hard way) that the ocean floor is *not* smooth like a bathtub. But how does bathymetry vary among ocean basins or within a basin? And how is the shape of the basin related to the age of the rocks or the way the basin formed? To answer these questions, you will begin by looking at the general characteristics of each basin. Then you will examine, in detail, the floors of the ocean basins.

- ▶ Launch ArcView GIS, then locate and open the **etoe\_unit\_1.apr** project file.
  - ▶ Open the **Ocean Floor Topography** view.
  - ▶ Using the Identify tool , click within each ocean basin to obtain its average depth and surface area.
1. Record the average depth and surface area of each ocean basin in Table 1. Then, rank the oceans by area and by depth with 1 = largest or deepest and 5 = smallest or shallowest. Round all values to the nearest 0.1.


**Table 1—Global ocean basin statistics**

Ocean	Average Depth (km)	Depth Rank	Area (million km <sup>2</sup> )	Area Rank
Arctic				
Atlantic				
Indian				
Pacific				
Southern				

2. Which ocean basin is the shallowest? How much shallower is this basin than the next shallowest basin?

- ▶ Close the Identify Results window.

It is clear that the Arctic Ocean is significantly shallower than the other oceans. Next, you will explore why. To do this, you will change the way the depth for each ocean is displayed. Currently, all depths are represented by a single shade of blue. You will load a new legend that classifies depth using different colors. (To speed things up, you will not turn the themes on until *after* you have loaded all of the legends.)

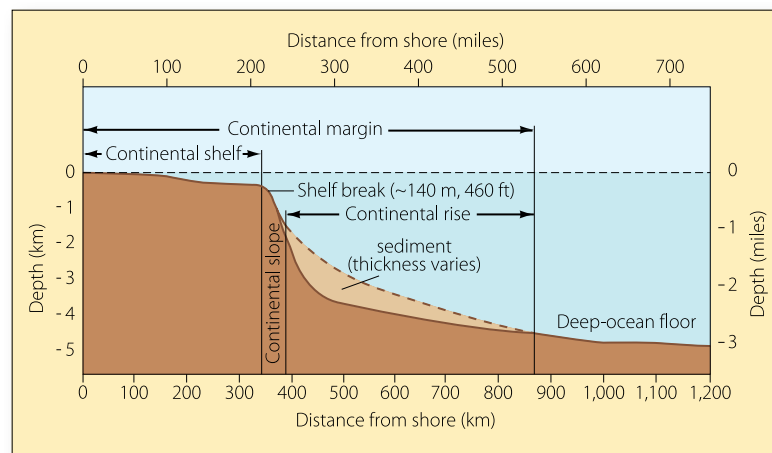
- ▶ Click the QuickLoad button , select the **Atlantic Bathymetry** legend, and click **OK**. Repeat this process to load legends for the **Arctic**, **Indian**, **Pacific**, and **Southern Ocean Bathymetry** themes.
- ▶ Turn on all five of the ocean bathymetry themes (Atlantic, Arctic, Indian, Pacific, and Southern).

Ocean depth is now displayed in shades of blue and purple.

3. List the color(s) and depth range of:
  - a. the shallowest part of the ocean
  - b. the deepest part of the ocean

► Turn on the **Continental Shelf** theme.


This theme shows where continental rocks are submerged beneath ocean waters. This submerged land, called the *continental shelf*, extends as far as several hundred kilometers offshore and to a depth of about 200 meters (Figure 1). Beyond the edge of the shelf, the steep *continental slope* drops away toward the *continental rise* and eventually the deep ocean floor.

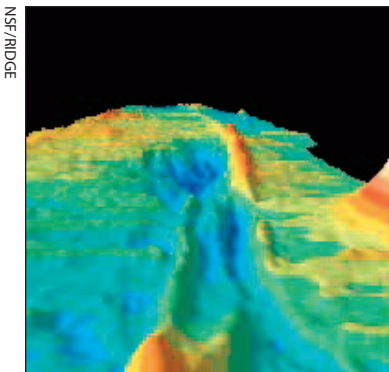


**Figure 1.** The continental margin.

4. Which ocean has the greatest area of continental shelf?

### Ridge flyby animation

To view a simulated “flight” along a ridge, click the Media Viewer button  and choose **Mid-Ocean Ridge Flyby** from the media list.



The existence of the continental shelf is not the only reason for shallow ocean floors. Using depth as a guide, locate the submerged mountain range in the Atlantic Ocean basin.

5. Which of the other ocean basins contain similar submerged mountains?

The submerged mountain range you discovered while examining the Atlantic Ocean bathymetry is the Mid-Atlantic Ridge, an example of a spreading ridge. The discovery of the Mid-Atlantic Ridge in the 1930s caused scientists to wonder about the processes that form this type of underwater ridge system and what other types of features may exist on the ocean floor.