

## MAJOR FEATURES OF THE OCEAN FLOOR

- 1 Although most of the topography of the ocean floor can be seen only indirectly through profile records, some features are visible in satellite photographs, others have been photographed from deep submersible vessels, and some areas have been "seen" through radar imagery. *Physiographic maps*, such as the one shown on the inside covers, however, provide the best visual reference for regional features of the ocean basins.
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- 10 The *oceanic ridge* is perhaps the most striking and important feature on the ocean floor. It extends continuously from the Arctic basin down the center of the Atlantic Ocean, into the Indian Ocean, and across the South Pacific. The oceanic ridge is essentially a broad, fractured swell generally more than 1400 km wide. Its
- 15 higher peaks rise as much as 3000 m above the ocean floor. A huge, cracklike valley, called the *rift valley*, runs along the axis of the ridge throughout most of its length. In addition, great fractures systems, some as long as 4000 km, trend across the ridge.
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- 25 The oceanic ridge divides the Atlantic and Indian oceans roughly in half and traverses the southern and eastern parts of the Pacific. On both sides of the ridge are vast areas of broad, relatively smooth, deep-ocean basins known as the *abyssal floor*. This surface extends from the flanks of the oceanic ridge to the continental margins and generally lies at depths of about 3000 m.

- 30 The abyssal floor can be subdivided into two sections, the abyssal hills and the abyssal plains. The *abyssal hills* are relatively small hills, rising as much as 900 m above the surrounding ocean floor. They cover from 80 to 85% of the Pacific sea floor, and thus they are the most widespread landforms on the Earth. Near
- 35 the continental margins, land-derived sediment completely covers the abyssal hills, forming flat, smooth *abyssal plains*.

- Isolated peaks of submarine volcanoes are called *seamounts*. Some seamounts rise above sea level and form islands, but most are completely submerged and are known only from oceanographic soundings. Although many seem to occur at random, others, such as the Hawaiian Islands, form chains along well-defined lines. Islands and seamounts testify to the extensive
- 40 and continuous volcanic activity that has occurred throughout the ocean basins. They also provide an important insight into the dynamics of the inner Earth.
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- The deep-sea *trenches* are the lowest areas on the Earth's surface. The Mariana Trench, in the Pacific Ocean, is the deepest part of the world's oceans—11,000 m below sea level—and many other trenches are more than 8000 m deep. Trenches have attracted the attention of geologists for years, not only because of their depth but also because they represent fundamental structural features of the Earth's crust. As is
- 50 illustrated in Figure 1.7, the trenches are invariably adjacent to island arcs or coastal mountain ranges of the continents.
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Figure 1.7

The major features of the ocean floor are related to plate boundaries. The oceanic ridge coincides with divergent plate margins. Trenches form where plates converge. The abyssal floor is the deep part of the ocean; off the flanks of the oceanic ridge.