

## Encyclopedia of Earth

# Ocean

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**Article Topic:** Oceans

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**Last Updated:** June 5, 2008

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## Introduction

Seen from space, our planet's surface appears to be dominated by the color blue.

The Earth appears blue because large bodies of saline water known as the oceans dominate the surface. Oceans cover approximately 70.8% or 361 million square kilometers (139 million square miles) of Earth's surface (Table 1) with a volume of about 1,370 million cubic kilometers (329 million cubic miles). The average depth of these extensive bodies of seawater is about 3.8 kilometers (2.4 miles). Maximum depths can exceed 10 kilometers (6.2 miles) in a number of areas known as ocean trenches. The oceans contain 97% of our planet's available water. The other 3% is found in atmosphere, on the Earth's terrestrial surface, or in the Earth's lithosphere in various forms and stores.

<b>Table 1: Surface area of our planet covered by oceans and continents.</b>			
<b>Surface</b>	<b>Percent of Earth's Total Surface Area</b>	<b>Area (Square Kilometers)</b>	<b>Area (Square Miles)</b>
Earth's Surface Area Covered by Land	29.2%	148,940,000	57,491,000
Earth's Surface Area Covered by Water	70.8%	361,132,000	139,397,000
Pacific Ocean	30.5%	155,557,000	60,045,000
Atlantic Ocean	20.8%	76,762,000	29,630,000
Indian Ocean	14.4%	68,556,000	26,463,000
Southern Ocean	4.0%	20,327,000	7,846,000
Arctic Ocean	2.8%	14,056,000	5,426,000

The spatial distribution of ocean regions and continents is unevenly arranged across the Earth's surface. In the Northern Hemisphere, the ratio of land to ocean is about 1 to 1.5. The ratio of land to ocean in the Southern Hemisphere is 1 to 4. This greater abundance of ocean surface has some fascinating effects on the environment of the southern half of our planet. For example, climate of Southern Hemisphere locations is often more moderate when compared to similar places in the Northern Hemisphere. This fact is primarily due to the presence of large amounts of heat energy stored in the oceans.

The International Hydrographic Organization has divided and named the interconnected oceans of the world into five main regions: Atlantic Ocean, Arctic Ocean, Indian Ocean, Pacific Ocean, and the Southern Ocean. Each one of these regions is different from the others in some specific ways.

## Atlantic Ocean

The Atlantic Ocean is a relatively narrow body of water that snakes between nearly parallel continental masses covering about 21% of the Earth's total surface area (Figure 1). This ocean body contains most of our planet's shallow seas, but it has relatively few islands. Some of the shallow seas found in the Atlantic Ocean include the Caribbean, Mediterranean, Baltic, Black, North, Baltic, and the Gulf of Mexico. The average depth of the Atlantic Ocean (including its adjacent seas) is about 3,300 meters (10,800 feet). The deepest point, 8,605 meters (28,232 feet), occurs in the Puerto Rico Trench. The Mid-Atlantic Ridge, running roughly down the center of this ocean region, separates the Atlantic Ocean into two large basins.

Many streams empty their freshwater discharge into the Atlantic Ocean. In fact, the Atlantic Ocean receives more freshwater from terrestrial runoff than any other ocean region. This ocean region also drains some of the Earth's largest rivers including the Amazon, Mississippi, St. Lawrence, and Congo. The surface area of the Atlantic Ocean is about 1.6 times greater than the terrestrial area providing runoff.



Figure 1: Atlantic Ocean region  
(Source: CIA World Factbook).

## Arctic Ocean



Figure 2: Arctic Ocean region  
(Source: CIA World Factbook).

The Arctic Ocean is the smallest of the world's five ocean regions, covering about 3% of the Earth's total surface area. Most of this nearly landlocked ocean region is located north of the Arctic Circle (Figure 2). The Arctic Ocean is connected to the Atlantic Ocean by the Greenland Sea, and the Pacific Ocean via the Bering Strait. The Arctic Ocean is also the shallowest ocean region with an average depth of 1,050 meters (3,450 feet). The center of the Arctic Ocean is covered by a drifting persistent icepack that has an average thickness of about 3 meters (10 feet). During the winter months, this sea ice covers much of the Arctic Ocean surface. Higher temperatures in the summer months cause the icepack to seasonally shrink in extent by about 50%.

## Indian Ocean

The Indian Ocean covers about 14% of the Earth's surface area. This ocean region is enclosed on three sides by the landmasses of Africa, Asia, and Australia (Figure 3). The Indian Ocean's southern border is open to water exchange with the much colder Southern Ocean. Average depth of the Indian Ocean is 3,900 meters (12,800 feet). The deepest point in this ocean region occurs in the Java Trench with a depth of 7,258 meters (23,812 feet) below sea level. The Indian Ocean region has relatively few islands. Continental shelf areas tend to be quite narrow and not many shallow seas exist. Relative to the Atlantic Ocean, only a small number of streams drain into the Indian Ocean. Consequently, the surface area of the Indian Ocean is approximately 400% larger than the land area supplying runoff into it. Some of the major rivers flowing into the Indian Ocean include the Zambezi, Arvandrud/Shatt-al-Arab, Indus, Ganges, Brahmaputra, and the Irrawaddy. Seawater salinity ranges between 32 and 37 parts per 1000. Because much of the Indian Ocean lies within the tropics, this basin has the warmest surface ocean temperatures.



Figure 3: Indian Ocean region  
(Source: CIA World Factbook).

## Pacific Ocean



Figure 4: Pacific Ocean region  
(Source: CIA World Factbook).

The Pacific Ocean is the largest ocean region (Figure 4) covering about 30% of the Earth's surface area (about 15 times the size of the United States). The ocean floor of the Pacific is quite uniform in depth having an average elevation of 4,300 meters (14,100 feet) below sea level. This fact makes it the deepest ocean region on average. The Pacific Ocean is also home to the lowest elevation on our planet. The deepest point in the Mariana Trench lies some 10,911 meters (35,840 feet) below sea level as recorded by the Japanese probe, *Kaiko*, on March 24, 1995. About 25,000 islands can be found in the Pacific Ocean region. This is more than the number for the other four ocean regions combined. Many of these islands are actually the tops of volcanic mountains created by the release of molten rock from beneath the ocean floor.

Relative to the Atlantic Ocean, only a small number of rivers add terrestrial freshwater terrestrial runoff to the Pacific Ocean. In fact, the surface area

of the Pacific is about 1000% greater than the land area that drains into it. Some of the major rivers flowing into this ocean region include the Colorado, Columbia, Fraser, Mekong, Rio Grande de Santiago, San Joaquin, Shinano, Skeena, Stikine, Xi Jiang, and Yukon. Some of larger adjacent seas connected to the Pacific are Celebes, Tasman, Coral, East China, Sulu, South China, Yellow, and the Sea of Japan.

## Southern Ocean

The Southern Ocean surrounds Antarctica extending to the latitude 60° South (Figure 5). This ocean region occupies about 4% of the Earth's surface or about 20,327,000 square kilometers (7,846,000 square miles). Relative to the other ocean regions, the floor of the Southern Ocean is quite deep ranging from 4,000 to 5,000 meters (13,100 to 16,400 feet) below sea level over most of the area it occupies. Continental shelf areas are very limited and are mainly found around Antarctica. But even these areas are quite deep with an elevation between 400 to 800 meters (1,300 to 2,600 feet) below sea level. For comparison, the average depth of the continental shelf for the entire planet is about 130 meters (425 feet). The Southern Ocean's deepest point is in the South Sandwich Trench at 7,235 meters (23,737 feet) sea level. Seas adjacent to this ocean region include the Amundsen Sea, Bellingshausen Sea, Ross Sea, Scotia Sea, and the Weddell Sea. By about September of each year, a mobile icepack situated around Antarctic reaches its greatest seasonal extent covering about 19 million square kilometers (7 million square miles). This icepack shrinks by around 85% six months later in March.



Figure 5: Southern Ocean region  
(Source: CIA World Factbook).

## Further Reading

- PhysicalGeography.net

## Citation

Pidwirny, Michael (Lead Author); J. Emmett Duffy (Topic Editor). 2008. "Ocean." In: Encyclopedia of Earth. Eds. Cutler J. Cleveland (Washington, D.C.: Environmental Information Coalition, National Council for Science and the Environment). [First published in the Encyclopedia of Earth October 2, 2006; Last revised June 5, 2008; Retrieved February 10, 2009]. <<http://www.eoearth.org/article/Ocean>>

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