

## **EXPEDITION EXPLORER GUIDE** THE SCIENCE OF **OCEANOGRAPHY**

The scientific study of the ocean is called Oceanography, and the people who study Oceanography are called Oceanographers. It is a relatively recent scientific discipline.

### **History of Oceanography**

The voyages of Christopher Columbus (1492-1504) and Ferdinand Magellan (1519-1521) opened up our understanding of the geography of the world and navigation of the ocean.

During this "Age of Exploration," our knowledge of the ocean greatly increased and laid the foundation for the science of oceanography.

> What Columbus' flagship might have looked like. The Santa Maria was a carrack (a merchant ship) between 400-600 tons and 75 feet long. Ferdinand Magellan also sailed in a carrack.



Between 1768 and 1779 the English Captain James Cook made three scientific ocean voyages to gather information on new animals and plants. Cook carried several scientists and artists on his voyages and they made significant observations and discoveries.

Cook's voyages around the Pacific and southern latitudes contributed much to European knowledge of these areas. Hawaii and Australia were encountered for the first time by Europeans, and his more accurate navigational charting of large areas of the Pacific was a major achievement.



Voyages of Captain James Cook



To create precise maps, latitude and longitude must be accurately determined. For centuries navigators could work out latitude by measuring the angle of the sun or a star above the horizon by using instruments. But, longitude was more difficult to measure accurately because it requires precise knowledge of the time difference between points on the surface of the earth.

Cook gathered accurate longitude measurements during his first voyage due to his navigational skills, the help of an astronomer, and the use of the newly published Nautical Almanac tables. On his second voyage Cook used the K1 chronometer, which was the shape of a large pocket watch. The K1 was the first clock used to keep accurate time at sea.





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For a long time people knew very little about the oceans beyond what happened close to shore. They knew how to fish, but exploration of the open ocean did not begin until fairly recently in human history. Early religions taught that gods controlled the oceans.

### The Birth of Oceanography

In 1872, England sent another group to study "everything about the sea." The ship was called "Challenger" and on it, British scientists crossed the Atlantic, Pacific and Indian Oceans in what was a four year long expedition, that covered 68,890 miles (127,600 km.)

On the voyage, they discovered and catalogued 4,717 previously unknown plants and animals! They also measured water temperatures as well as the ocean depths. A great many inventions followed Challenger's opening the oceans to scientific exploration. It is still considered one of the greatest scientific expeditions of all time.

In 1912, the German scientist Alfred Wegener introduced the theory of "continental drift" – which claimed that the earth's continents had at one point been one supercontinent. This theory was debated for years, but much of it still stands.



It wasn't until the 1950's, that scientists discovered widening cracks in the ocean floor, which could only be caused by movements of the earth's crust. From this, scientists arrived at a theory of plate tectonics.

# What parts of the ocean do Oceanographers study?





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Oceanography is a very broad science with many areas of study. Some scientists focus on specific areas like marine biology and the study of sea life. Other oceanographers study global ocean systems and how they impact the whole of the earth.

#### **Major Ocean Currents**

Today, we know much more about the ocean and its impact on life on this planet. But there is always so much more to learn. Looking at the large scale ocean current, called "thermohaline circulation", we are reminded of the unity of the one world ocean. Thermohaline circulation shows the flow of the ocean's waters around the globe. This circulation is driven by winds, heat from the sun and differences in salinity. Extensive mixing takes place between the various ocean basins, reducing differences between them and making the Earth's oceans a global system.

