Disneynature

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oceans

EDUCATOR'S GUIDE

Educational Materials developed in cooperation with NATIONAL GEOGRAPHIC

Introduction

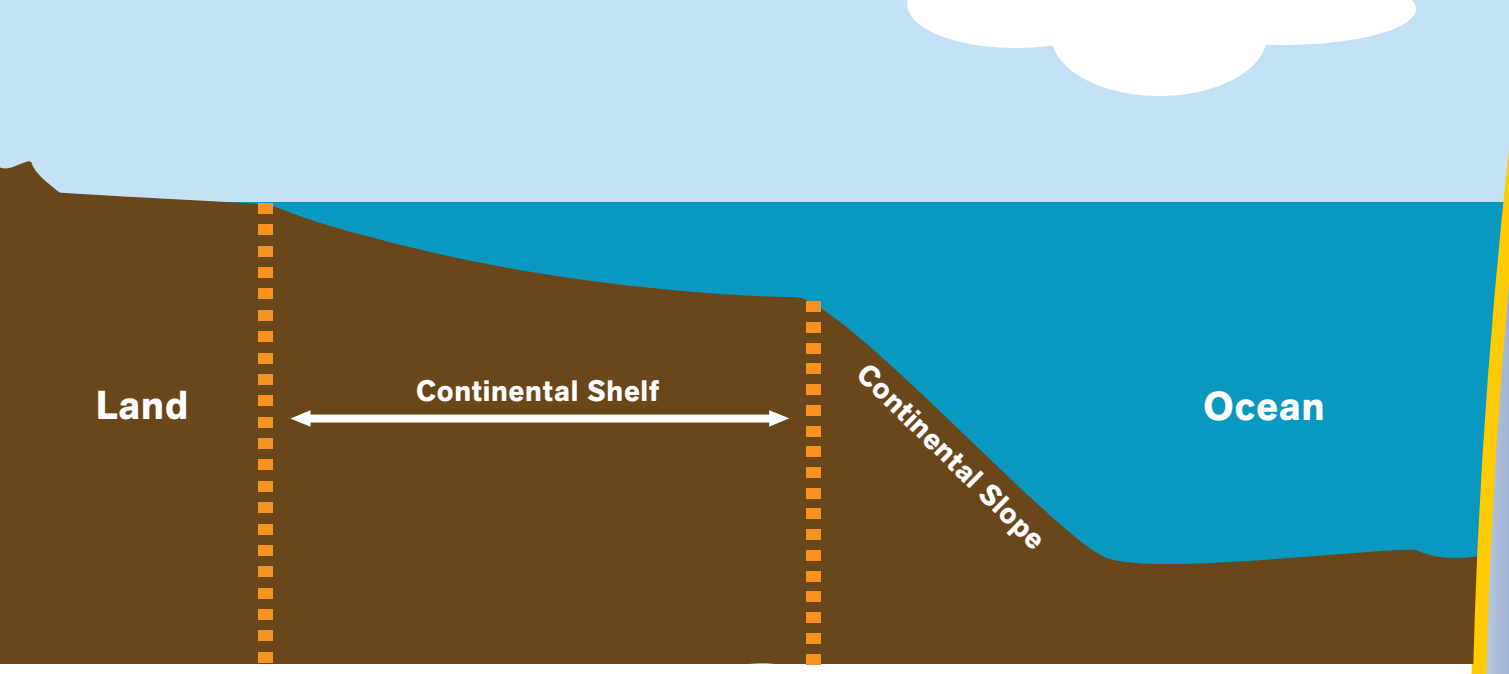
Disneynature OCEANS is an inspiring adventure into a liquid world few of us have ever seen before. Yet the oceans cover more than 70 percent of our planet. The second Disneynature film, OCEANS, offers an unprecedented window into this largely unexplored world as well as an extraordinary educational opportunity.

OCEANS ignites the imagination. It engages students to want to learn standards-based science content. Through this introduction to themes in the film, students will learn earth science, life science, physical science, chemistry, and geography.

This Educator Guide builds on many of the themes developed in the film and molds them into classroom lessons that correlate to your required science standards.

Disneynature OCEANS is also a great way to introduce differentiated instruction to your science lessons. Through seeing, listening, and reading, the film and this guide will improve comprehension for students at all reading levels. It will also give them more of a real-world learning experience through this multi-media approach.

OCEANS will allow students to see for themselves the wonderful cast of characters that live in this world of liquid space. They will also learn how the oceans control much of what happens on land.



Land Meets Water

While the oceans cover most of Earth today, they didn't always exist. According to scientists, early Earth was one large landmass. **Volcanoes** erupted huge amounts of gases into the atmosphere. These gases combined to create water vapor. Eventually, the water vapor condensed and fell to the ground as rain. It rained for thousands of years, filling the lowest parts of the ground and making the first oceans.

Today, Earth's landmasses slowly transition into the oceans. This transition begins with the **continental shelf.** It is a gently sloping extension of the continents submerged underwater. The gently sloping continental shelf suddenly plunges downward into the **continental slope.** The continental slope extends down to the **ocean plains, mountains, ridges,** and **trenches.**

Most of these underwater geographic features are hidden from view. However, some stick above the surface in the form of **islands.** The Hawaiian Islands are great examples of this. All of these islands are actually the peaks of giant underwater volcanoes (mountains).

Recycling Crust

The land, or **crust,** at the bottom of the ocean is different than the crust that forms Earth's landmasses. For instance, it is much younger. The oldest rocks brought up from the ocean are only about 200 million years old. This is much younger than Earth's age, 4.5 billion years.

New crust forms at the **mid-ocean ridge.** This is a giant underwater mountain range that runs along the ocean floor.

The new crust pushes outwards from the mid-ocean ridge, moving pieces of Earth's crust, called **plates.** The moving plates sometimes smash into one another. When crust that makes up the continents crashes into crust that makes up the ocean floor, a **subduction zone** forms. The crust from the ocean floor dives beneath the continental crust and melts into magma, molten rock deep inside Earth. The magma slowly makes its way back to the surface, either through a volcano on land or the mid-ocean ridge. Magma that bursts through the surface on land is called **lava.** In this way, all rocks on Earth are recycled and it makes sense that ocean rocks are younger than rocks on the landmasses.

How Many Oceans?

How many oceans surround Earth's continents? This may sound like a simple question, but geographers do not agree on one answer. In reality, if you look at a globe or a world map, you will see that the water that surrounds Earth's continents is connected, forming one large body of water. This is called the World Ocean.

Traditionally, however, geographers have divided the World Ocean into four smaller oceans. These are the Arctic Ocean, Atlantic Ocean, Indian Ocean, and Pacific Ocean. Many geographers, including geographers at the National Geographic Society still say there are four oceans.

A number of geographers, however, refer to a fifth ocean. In 2000, the International Hydrographic Organization named it the Southern Ocean. It is made up of the waters from the southern portions of the Atlantic, Indian, and Pacific Oceans and completely surrounds Antarctica. In this sense, the fifth ocean is really comprised of part of three of the traditional four oceans.

Geographers who believe in the fifth ocean say creating a new ocean is no different than changing a country's boundaries, which happens fairly often. They also point out that the ocean is based on new knowledge gained after studying **ocean currents.** These are rivers of water that flow through the oceans. Ocean currents affect weather and climate worldwide.

The largest ocean current flows through the Southern Ocean. About 100 times more water flows through this current than flows through all the rivers on land.

TALK IT OUT

Explain that geographers do not always agree and have different points of view. They talk about their different opinions and try to reach agreement. Tell students to imagine that they are geographers who are trying to determine how many oceans surround Earth's continents.

Divide the class into three groups. Each group is to research a different number of oceans. The first group will research one World Ocean. The second group will research four oceans. The third group will research five oceans. Direct the groups to use the internet and the library to research the number of oceans. After students have finished their research, ask each group to present the evidence that supports its side. After all the groups have made their presentations, give each group time to ask questions of the other groups. Then take a class vote on the number of oceans.

How the Oceans Impact the Land

The ocean is so large that it affects our entire planet. It holds about 320 million cubic miles of water, roughly 97% of all Earth's water. Seawater is, on average, 3.5% salt, making it undrinkable.

The oceans absorb heat from the sun and transfer it to the atmosphere. Both the oceans and the atmosphere distribute the sun's heat around the planet. This drives global weather.

Ocean water located near the **Equator,** an imaginary line that runs around the middle of Earth, is warmer than in other areas. This is because sunlight directly hits this area. Sunlight warms the air, which warms the water.

Ocean water located near Earth's Poles is colder than ocean water located in other areas. This is because the Poles get less sunlight than other areas. The air is cooler, which keeps the water cooler.

Ocean currents are huge rivers of water that flow through the oceans. Currents can form at different levels in the ocean. Near the surface, winds and Earth's rotation causes ocean currents. The currents move in large circular paths bordered by the continents. These circular paths are called **gyres.**

Currents can carry warm or cold water. This is how ocean currents transfer heat worldwide.

The Gulf Stream is an example of one of these currents. It flows north and east out of the Gulf of Mexico, winding its way up the Atlantic Ocean, east of the United States, toward western Europe. It brings warm water from the Gulf of Mexico, which warms the air in the areas it passes through, increasing the temperature. It can also affect humidity and rainfall. As a result, much of the eastern United States and western Europe are warmer than other areas located on the same latitude.

The gyre is completed as cold water flows south and east from western Europe, south toward northwestern Africa, and then west toward the east coast of North and South America. The colder water cools these areas and makes them less tropical. As a result, eastern Florida is cooler than other areas at the same latitude.

The California Current does the same thing on the U.S. West Coast. The current flows south, bringing cool water from the north. It cools the air along the coast, which can be much warmer inland.

Ocean Animals Need Land

Many ocean animals are connected to land, too. For example, marine iguanas and sea turtles live in the oceans and spend at least some time on land.

The marine iguana lives on the rocky coasts of the Galapagos Islands. Males dive into the water to graze on seaweed. Females can't dive as deep and must eat the seaweed exposed during low tide. Marine iguanas also have a pretty cool adaptation to salt—they are actually able to use algae to get rid of the salt they ingest by blowing it out their nose!

Sea turtles are another example of an ocean animal that depends on the land. Female green sea turtles leave the oceans for land every couple of years to lay eggs.

A green sea turtle begins its life nestled inside a leathery egg buried in a sandy nest on a beach. It struggles to push its way through the egg and then digs its way to the top of the nest with about 70-150 other hatchlings.

Once the hatchlings hit the beach, they scramble towards the water. They must make it past predators like birds, snakes, crabs, and sometimes even raccoons and dogs, in order to reach the water.

The green turtle hatchlings that survive grow to weigh about 500 pounds. Despite their immense size, green sea turtles are herbivores that mainly eat sea grass as adults. Sea grass is the only flowering plant in the oceans.

Even though green sea turtles live in the ocean, they breathe air. They generally dive for up to five minutes, then they head for the surface to inhale air. They can sleep underwater for up to five hours.

Sea turtles swim through the oceans, stopping in many habitats. A **habitat** is the place a plant or animal lives. The plant or animal gets everything it needs to survive from its habitat.

THE DEEPEST PLACE

Extending down to a depth of seven miles in the Pacific Ocean, the Mariana Trench is the deepest place in the ocean. It is six times deeper than the Grand Canyon.

Activity
Grades 4-6

Fresh Water vs. Seawater; Which is Less Dense?

Learning Objective

To learn that fresh water is less dense than seawater.

Tasks

1. Divide students in groups of three or four. Give each group two 10-ounce cups. Ask them to label one of them "fresh water" and the other "seawater."

2. Pour 8 ounces of fresh water into each cup labeled "fresh water." Pour 8 ounces of seawater into each cup labeled "seawater." To make the seawater, add three or four tablespoons of salt to a quart of fresh water. While real seawater is more complex than this mixture, it matches the salinity of seawater.

3. Explain to students that they are about to place an ice cube in each cup. Ask them to predict if the ice cube will melt faster in the fresh water or seawater, or if it will melt at the same rate. Have them record their predictions.

4. Distribute two ice cubes to each group. The ice cubes should be about equal in size.

5. Direct a student from each group to place one ice cube in each of the two cups at the exact same time. Have another student record the time it takes for each ice cube to melt.

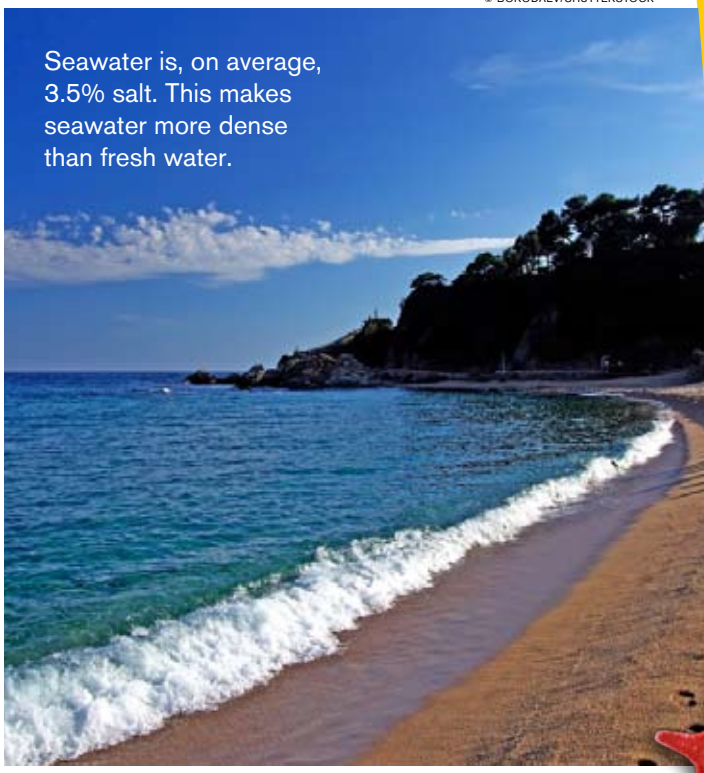
6. Ask students to analyze their results. Then have them write their observations and conclusions.

Observations and Conclusions

The ice cube in the cup of fresh water melted faster than the ice cube in the seawater.

The water produced from the melting ice cube in the fresh water is colder than the rest of the fresh water. Cold fresh water is denser than warm fresh water, so it sinks.

In the cup with seawater, the melting fresh water forms a pool around the ice cube and doesn't sink. This is because fresh water is less dense than seawater. This pool of cool water insulates the ice cube, which causes it to melt at a slower rate than the ice cube in the fresh water.



Seawater is, on average, 3.5% salt. This makes seawater more dense than fresh water.

Activity
Grades 2-6

How Big are the Oceans

Learning Objective

To learn the names of the oceans and continents, and to understand that the world ocean is much larger than the continents.

Tasks

1. Make copies of the world map on the next page and give one to each student. Display a copy of the map on a projector and point to the continents. Explain that the continents are the largest land masses on Earth. Tell students that there are seven continents. As you point to each continent, name it or ask students to name it.

2. Point out the oceans. Remind students that geographers do not agree on the number of oceans. As you point to each ocean, name it or have students name it. After students name the oceans, remind them that all the oceans are connected to form one world ocean.

3. To help students visualize the size of the ocean, tell them that they are going to make models of the world ocean and each continent.

4. Hand each group a sheet of paper and a ruler. Have them cut a square measuring 8 inches by 8 inches and color the sheet blue.

5. Explain that the square represents a scale model of the world ocean. The world ocean covers 134,000,000 square miles. The scale is approximately 1 square inch for every 2 million square miles.

6. Next, hand each group another sheet of paper measuring 8.5 x 11 inches. Tell them that they will use the sheets to cut out squares that represent the area each continent covers.

7. Write the following scale on the board so students will know how to cut out each continent. The numbers in the right column show the sizes of the squares. Please note that all numbers are rounded.

continent/ocean	inches
World Ocean	8.2 x 8.2
Asia	2.9 x 2.9
Africa	2.5 x 2.5
North America	2.1 x 2.1
South America	1.9 x 1.9
Antarctica	1.6 x 1.6
Europe	1.4 x 1.4
Australia	1.2 x 1.2

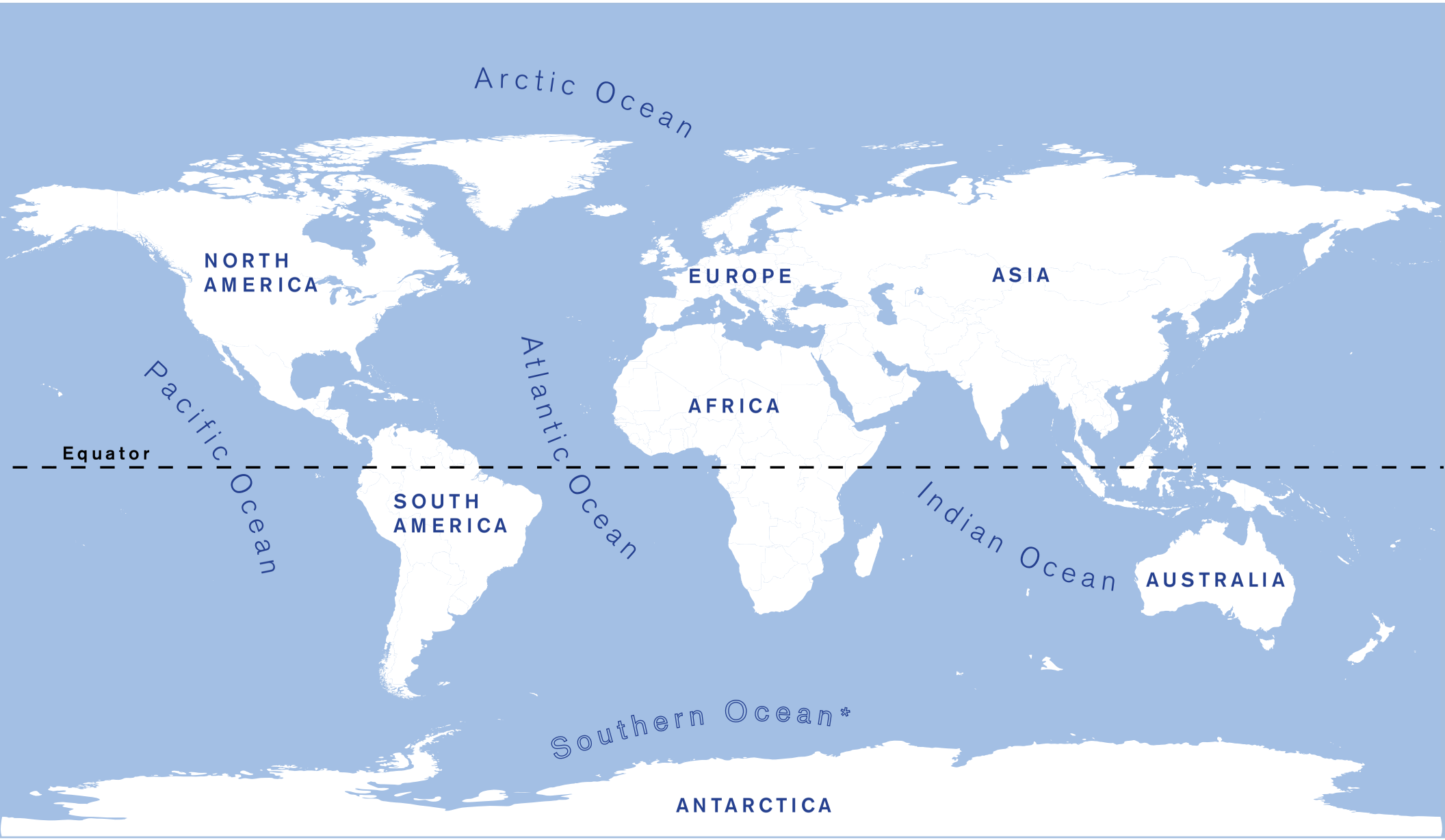
8. After students have cut out each square, have them write the continent's name on it.

9. After all the squares are cut out, have students arrange them in order from largest to smallest. Ask them if they are surprised by what they see. Many students may have thought that North America is the largest continent.

10. Have students place the squares on the large square that represents the oceans. Ask them: Which is larger—the world ocean or all the continents combined?

11. Ask students in grades 4 and 5 to estimate how much larger the world ocean is compared to the continents. Note that the combined area of the continents is 57,000,000 square miles and the oceans cover 134,000,000 square miles. So the world ocean is about three times larger than the continents.

Explore the Oceans



*The Atlantic, Indian, and Pacific Oceans merge into waters around Antarctica. Some geographers call this area the Southern Ocean.