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Created and produced by Julia Bruce, Rachel Coombs,
Nicholas Harris, Sarah Hartley and Jennifer Johnson,
Orpheus Books Ltd.

Text Nicholas Harris

Consultant Ian J. Fairchild
Professor of Physical Geography
University of Birmingham

Illustrated by Gary Hincks

Other illustrators Susanna Addario, Peter Dennis, Betti Ferrero,
Ray Grinaway, Ian Jackson, Steve Noon,
Nicki Palin and Peter David Scott

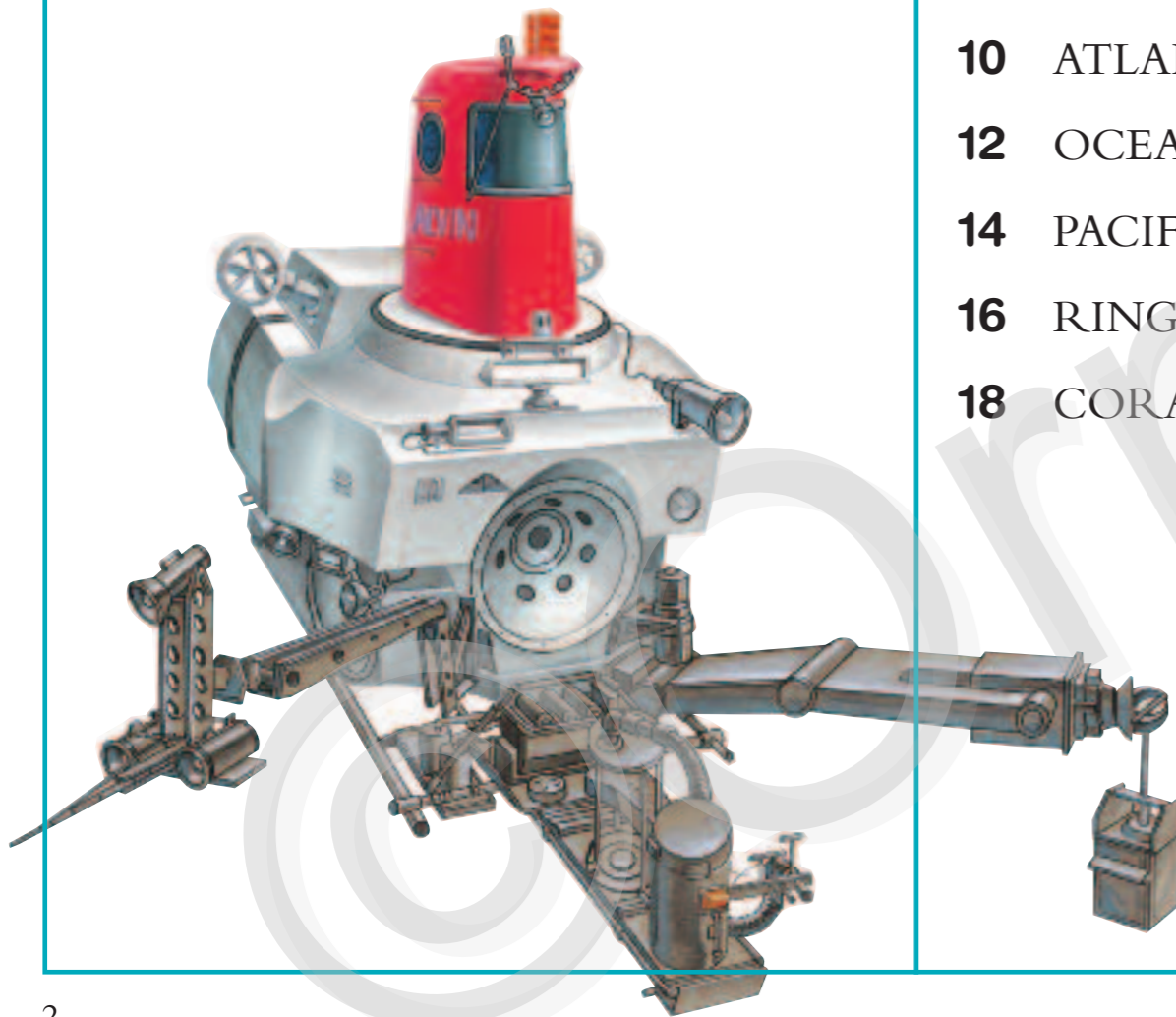
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CONTENTS

- 3 THE OCEANS
- 4 OCEAN CURRENTS
- 6 TIDES, WINDS AND WAVES
- 8 MONSOONS



- 9 HURRICANES
- 10 ATLANTIC OCEAN
- 12 OCEAN FLOOR
- 14 PACIFIC OCEAN
- 16 RING OF FIRE
- 18 CORAL ISLANDS



THE OCEANS



OURS IS A watery planet—the oceans cover more than 70% of the Earth's surface. They are home to about 90% of all the world's living things. The deep ocean is the last great unexplored region on Earth and scientists estimate there are thousands of marine species yet to be discovered. Even if you live nowhere near the sea, the oceans have a major effect on your life. They influence the world's weather systems, and we humans rely on them for many of our food and mineral resources. But the oceans are in danger—from us. Pollution and overfishing are just two examples of how humankind may be damaging the oceans.



- 20 INDIAN OCEAN
- 22 TSUNAMI
- 24 SOUTHERN OCEAN
- 26 ARCTIC OCEAN



- 28 FISHING
- 29 OIL
- 30 EXPLORING THE OCEANS
- 31 THE OCEANS OF THE FUTURE
- 32 INDEX

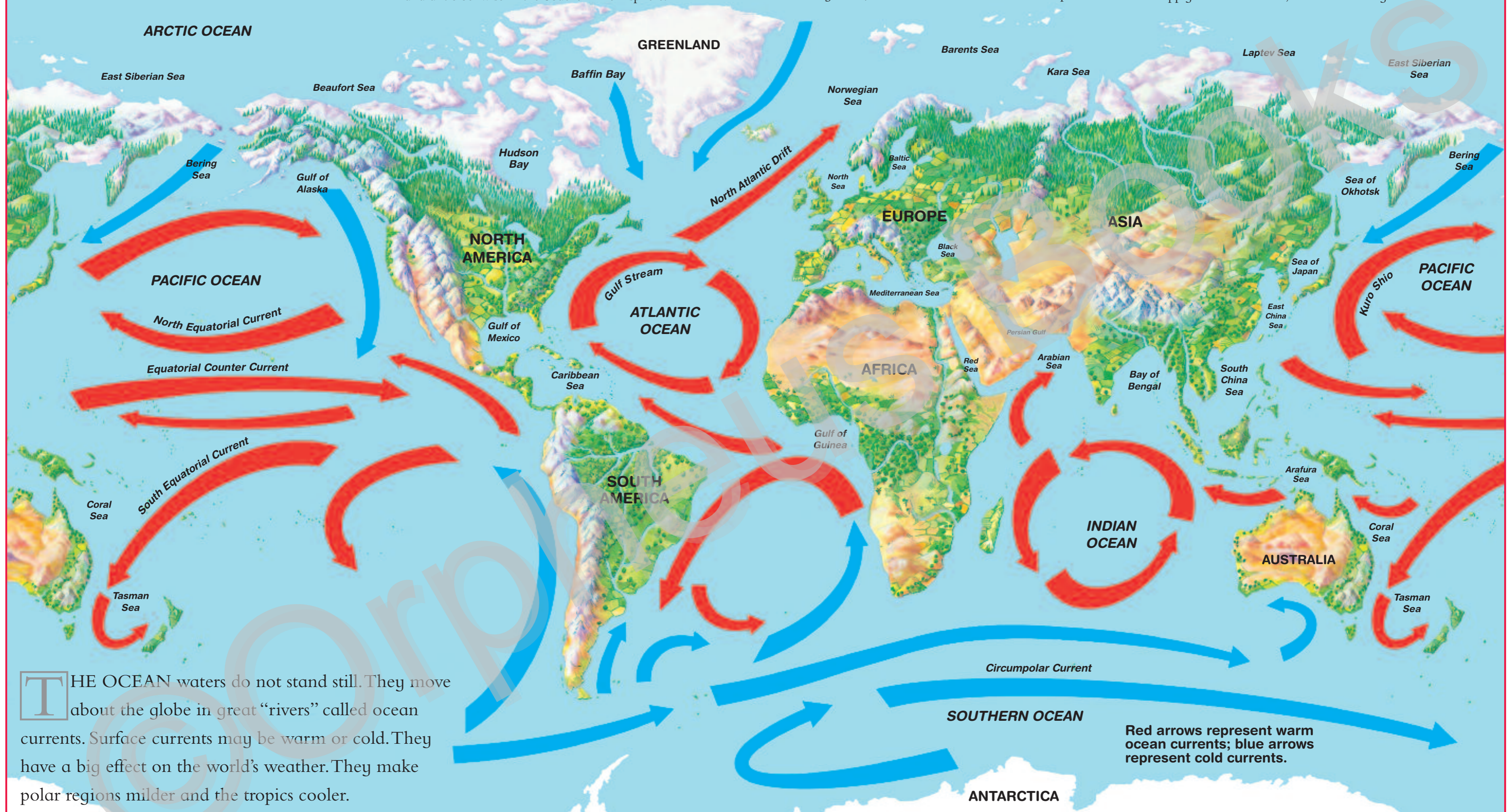


OCEAN CURRENTS

Surface currents are driven by the winds. They move in roughly circular patterns, called gyres. These go round in a clockwise direction in the Northern Hemisphere and anticlockwise in the Southern Hemisphere.

In the Atlantic Ocean, there is a warm current flowing northeast from the Gulf of Mexico as far as the coast of Norway in northern Europe. Called the Gulf Stream, it brings mild, wet weather to northwestern Europe.

Every few years, ocean currents in the Pacific Ocean change about. Warm water moves eastwards towards South America. Called El Niño ("The Child"), it cuts off the food supply for the local fish, and causes droughts and storms.



THE OCEAN waters do not stand still. They move about the globe in great "rivers" called ocean currents. Surface currents may be warm or cold. They have a big effect on the world's weather. They make polar regions milder and the tropics cooler.

Red arrows represent warm ocean currents; blue arrows represent cold currents.

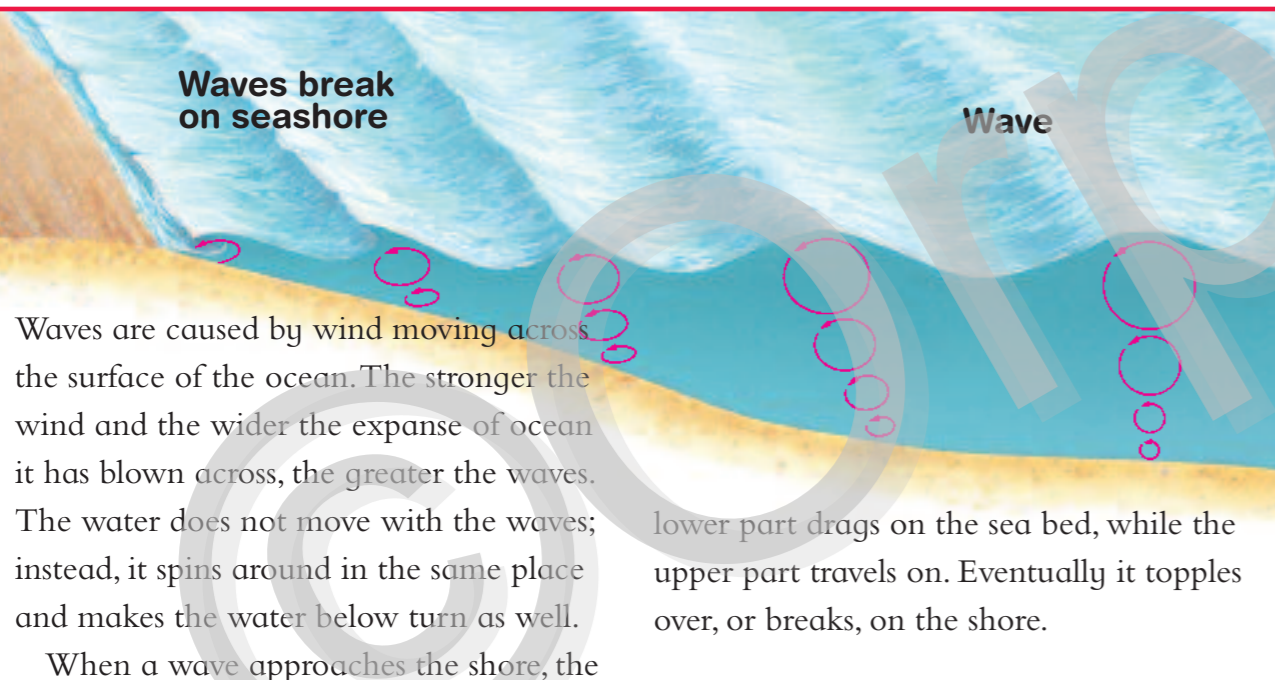
TIDES, WINDS AND WAVES

IN MOST PARTS of the world, the sea rises up the shore and falls away again twice a day. These risings and fallings of sea level are called tides. The tidal range is the difference between high and low tide. Seas that are almost surrounded by land, such as the Mediterranean, have a very small tidal range.

The weather at sea has far-reaching effects. Wind causes waves and drives ocean currents (see page 4). Wind also carries moist air, evaporated from ocean waters, around the globe.



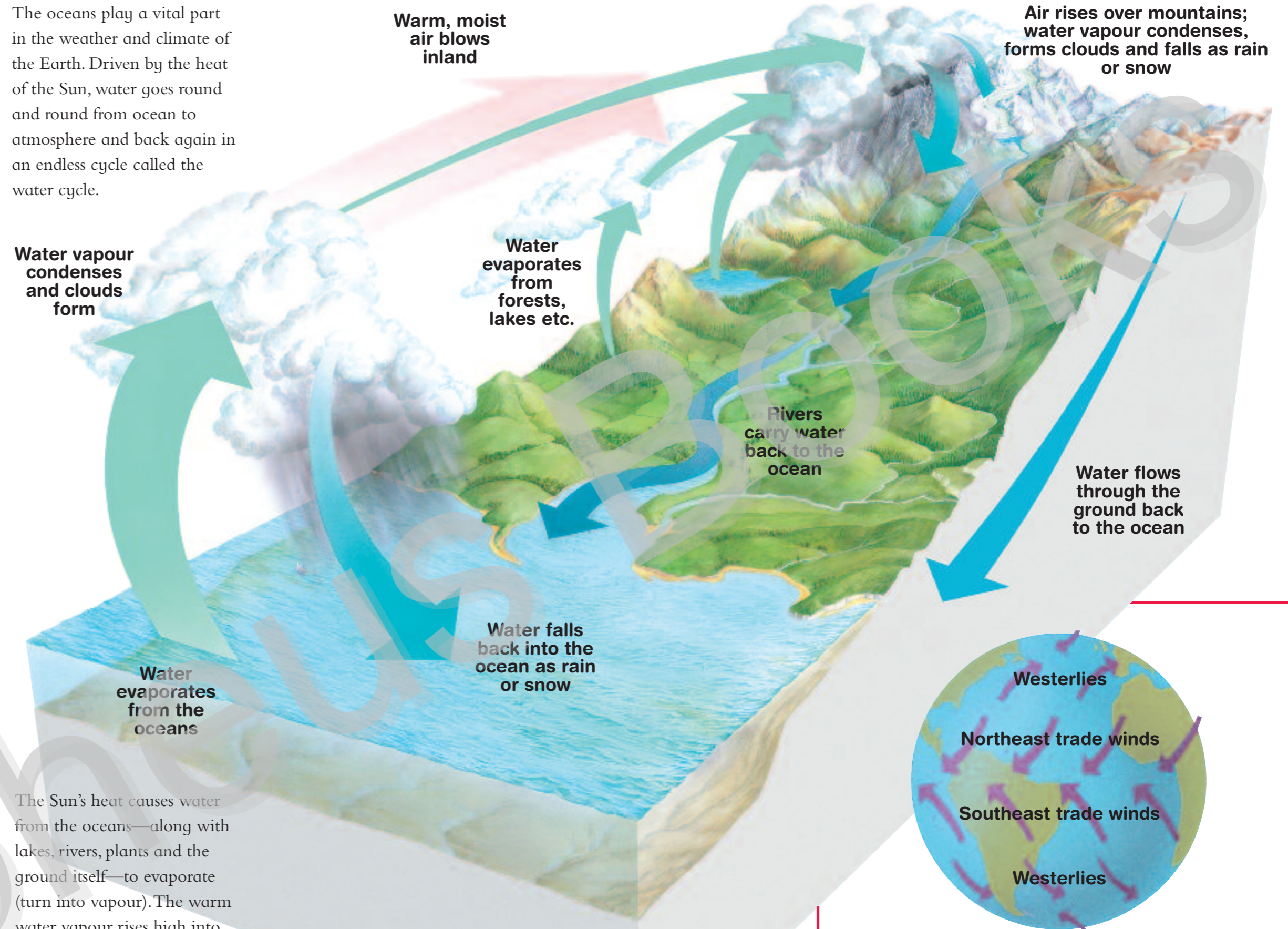
Tides are caused by the pull of gravity that the Sun and Moon have on the Earth. As the Earth spins round, the ocean waters on the side closest to the Moon (and the opposite side) bulge outwards, causing high tides. The rest of the world has low tides. These are called neap tides (left). When the Sun and Moon are in line, the Sun's gravity adds to that of the Moon. This makes the high tides higher and low tides lower. These are called spring tides (right).



Waves are caused by wind moving across the surface of the ocean. The stronger the wind and the wider the expanse of ocean it has blown across, the greater the waves. The water does not move with the waves; instead, it spins around in the same place and makes the water below turn as well. When a wave approaches the shore, the

lower part drags on the sea bed, while the upper part travels on. Eventually it topples over, or breaks, on the shore.

The oceans play a vital part in the weather and climate of the Earth. Driven by the heat of the Sun, water goes round and round from ocean to atmosphere and back again in an endless cycle called the water cycle.



The Sun's heat causes water from the oceans—along with lakes, rivers, plants and the ground itself—to evaporate (turn into vapour). The warm water vapour rises high into the atmosphere where it cools. It begins to condense (turns back to liquid) around tiny particles in the air, such as sea salt or dust. Millions of these tiny droplets gather together to form clouds. In the highest clouds, the water freezes into ice.

When the ice or water droplets become too heavy to stay up, they fall as rain—or snow if the air below is freezing. Much rain or snow falls directly back into the ocean. But winds may carry the warm air or clouds across the land. The rain or snow falls to the ground, and the water finds its way into streams and rivers. These carry the water back to the oceans. Some water seeps into the ground and flows very slowly through the rocks themselves. This is called groundwater.

The ocean currents (see page 4) are produced by the wind. Winds are themselves the result of the Sun's uneven heating of the Earth's surface. In the tropics, the surface is hot. The air rises and cool air from both to the north and the south blow in to replace it. These are called trade winds. The Earth's rotation causes the winds in the Northern Hemisphere to turn to the right, and those in the Southern Hemisphere to the left. Winds carry rain-laden clouds around the globe.