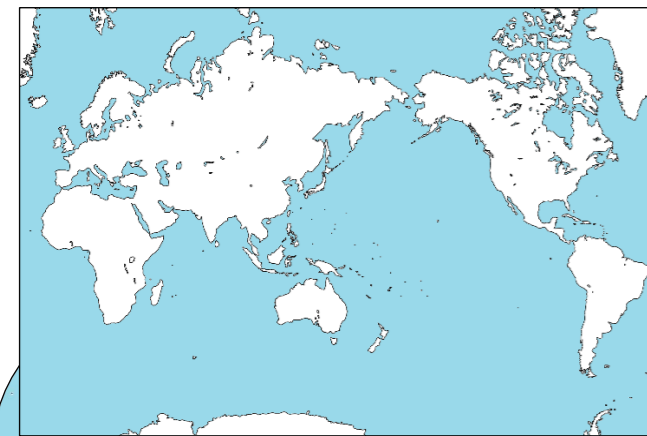


Principle 1 The Earth has one big ocean with many features.

1 | The oceans are connected all around the world

Names are given to the oceans around the world, such as the Pacific Ocean and the Atlantic Ocean. This makes it seem like they are separate oceans, but that is not actually the case.



Land and sea on a world map (seas and lakes are shown in blue)



Ariake Sea

For example, look at the Earth from the view of the South Pole using a globe.

You can see that the Pacific Ocean, the Atlantic Ocean and the Indian Ocean are all connected.

It's the same for the Ariake Sea, with which we are very familiar. Although the Ariake Sea is enclosed by land, looking at the map, we can see that it connects to the ocean through the Shimabara Peninsula.

In this way, for those living on Earth, there is only one ocean.

Because the ocean is connected, we can send goods all around the world by vessels.

Water, materials, and even creatures living in the sea can travel the world. However, would that still be

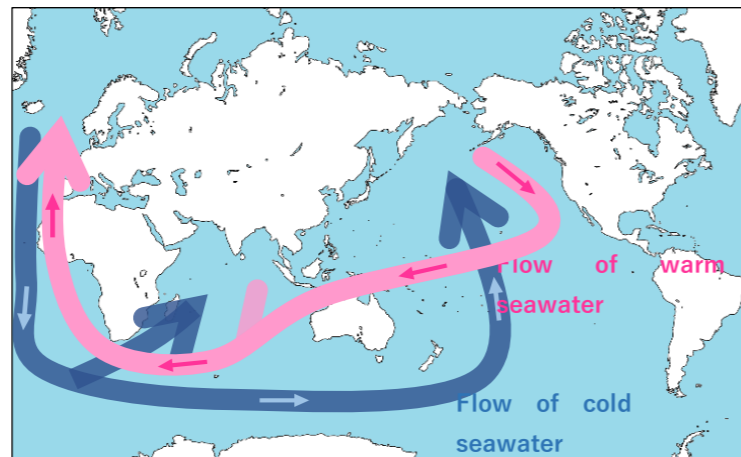
true if the seawater was polluted? Polluted water would also end up moving all around the world.

2 | The flow of the ocean carries heat and energy

The flow of seawater circulates around the ocean all over the world. This is called a "circulation"

The circulation is caused by the rotation of the Earth, the ebb and flow of tides, and heat from the sun, among other reasons. Because of this circulation, seawater that warms up in the equatorial regions is cooled down near Greenland and Antarctica, and then it descends deep into the ocean before returning to the equatorial region about 1000 years later.

Thanks to this circulation, heat and salts in the seawater are transported all around the world, creating global climates and protecting the lives of creatures in the sea. However, today, this cycle is being impacted by global warming.



Seawater circulation (See: JMA website ("Underground circulation"))

3 | The sea produces rain, which falls on the land and flows back to the sea, and so on

On days when the weather is bad, lots of clouds form in the sky, and rain starts to fall.

Clouds are masses of water vapor (little drops of water).

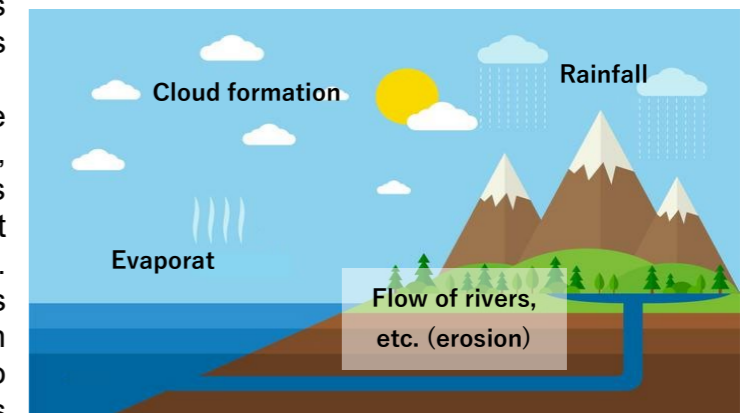
When water vapor joins together, it forms clouds, and when they get larger, they form raindrops and fall to the ground.

Where does the water vapor come from that forms these clouds? Actually, it is the sea that produces water vapor.

Seawater that has been warmed by heat from the Sun partially evaporates and creates water vapor, which rises into the sky. This water vapor forms clouds. Clouds release rain, and the rainwater that falls on the land goes into rivers that flow to the sea.

In other words, there is a "cycle" of water that goes from the sea to land, which is caused by ocean activity and solar heat. Rocks on the land are also shaped by this rainwater (erosion). Components from the rocks that are eroded by water add into the sea, which makes the seawater salty.

Rain is essential to our lives for crops and drinking water, for example. However, today, the amount of water vapor is increasing due to global warming, and heavy rain is causing disasters.

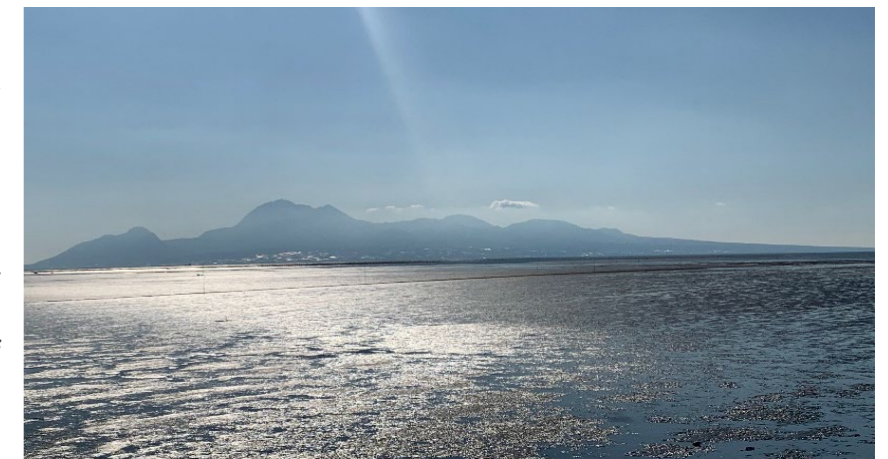


Water circulation cycles in the sea and on land

4 | Sea levels rise and fall

The sea is always moving, so the elevation of the sea is not always the same. The sea level rises and falls every day due to the gravitational pull from the moon and the centrifugal force from the rotation of the Earth.

Over long periods, the sea level changes. When the Earth's air temperature is low, seawater in cold regions freezes, which lowers the level of the sea. About 20,000 years ago, during a period known as the "Ice Age," the average temperature on Earth was about 6°C lower than it is now.



Receding sea water (low tide), Ariake Sea

At that time, the sea level was at least 100 meters lower than it is today. We can see that, when the Earth's air temperature differs by 6°C, the sea level undergoes major changes.

Today, due to global warming, the ice sheets on Greenland and the Antarctic continent are melting, and the sea level is gradually increasing. As the sea level continues to rise, low-lying islands and deltas might be submerged.