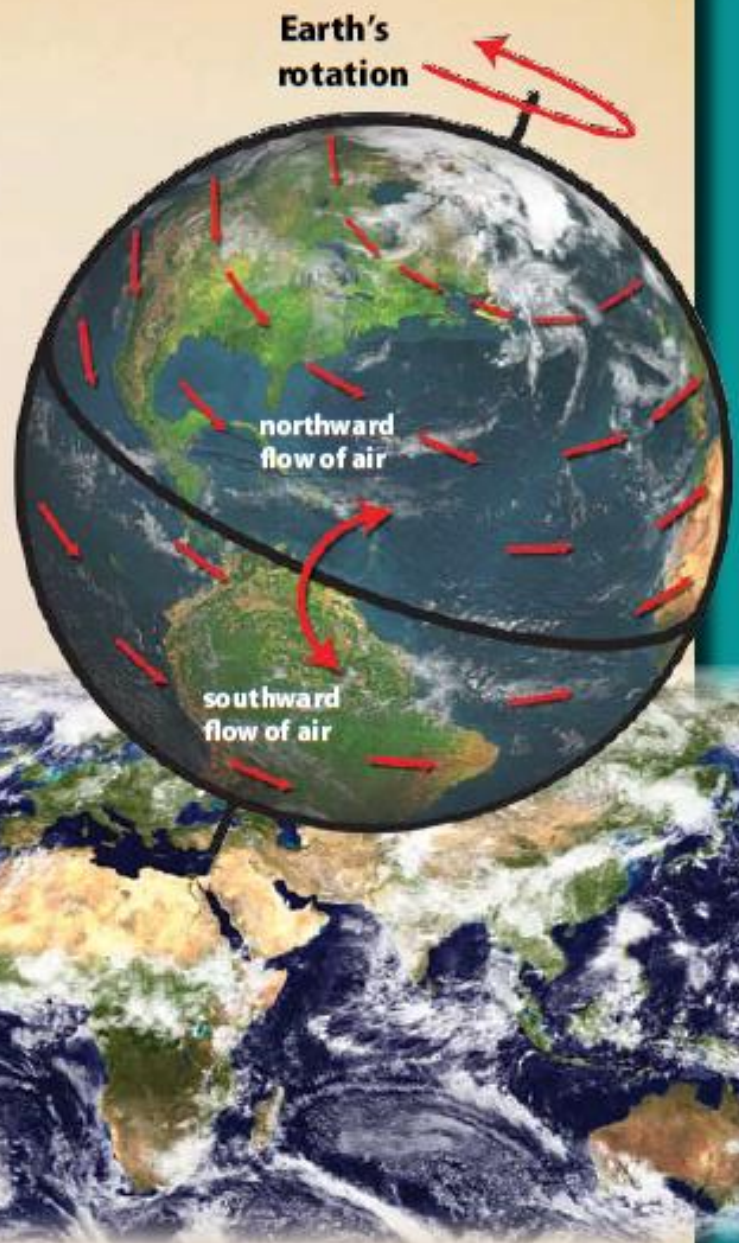


# Jet Streams and Trade Winds

Have you ever wondered why some days there are clouds in the sky and some days there aren't? You probably know why: winds move clouds across the planet. What you may not know is that all weather happens in the layer of atmosphere closest to Earth's surface. Many things affect weather. The biggest factors are heat, water, and wind.



## Jet Streams

The sun warms the Earth's surface, which evaporates water into vapor. The vapor rises high into the sky, where four rivers of wind called jet streams flow. Thousands of miles long, hundreds of miles wide, and several miles deep, jet streams are a driving force of weather changes. The jet streams lower the vapor's heat and move it across the planet. Jet streams blow 200 kilometers per hour (125 miles per hour) on average. Jet streams always flow parallel to the equator, but they move north and south over the course of the year.

Jet streams weren't discovered until the modern era, when newly invented jet planes flew high enough to find them. In fact, that is where they got their names.



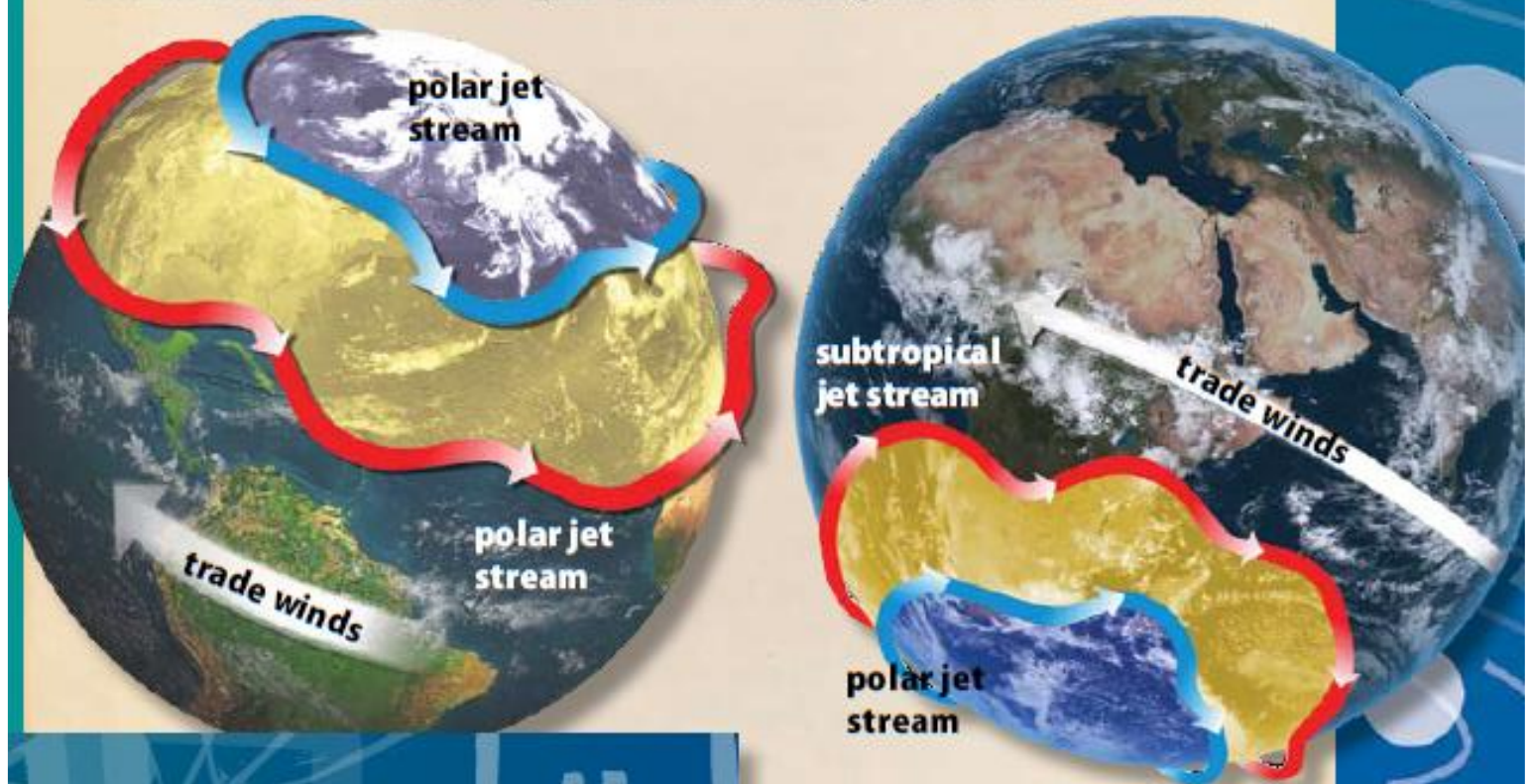
## Trade Winds

Before scientists knew about jet streams, they tried to understand trade winds and monsoons. Trade winds blow primarily east to west in regular patterns; monsoons are big, violent rainstorms that occur seasonally.

Halley's work in water science relates mainly to weather. In 1686, Edmond Halley published an important paper and a chart on the trade winds and monsoons. In this same paper, Halley wrote that the sun is the driving force behind most of the weather on Earth. He was right. He also showed the relationship between air pressure, altitude (height above sea level), and weather. Air pressure and altitude affect the weather.

Halley's theory on Earth's trade winds couldn't explain why they always blew in the same direction, east to west. George Hadley was a lawyer and amateur scientist who lived about the same time as Halley. He figured out the cause behind trade winds' constant direction.

Hadley explained that the sun evaporates a great deal of water near the equator. The water vapor in the warmer air would rise up into the atmosphere and flow north and south away from the equator. Eventually, this water cools and falls back to Earth. The falling rain pushes air down, and wind is caused by this motion of the air falling. Since the Earth rotates on its axis, it "spins" that wind, causing it to blow east and west.



### Comprehension Question

What provides the energy that powers the wind?