

The background features a light gray gradient with several realistic water droplets of varying sizes scattered in the corners. The droplets have highlights and shadows, giving them a three-dimensional appearance.

ENERGY TRANSFER



ESSENTIAL QUESTION:

**HOW DOES ENERGY MOVE
THROUGH EARTH'S SYSTEM?**



The background features a light blue gradient with several realistic water droplets of various sizes scattered across the top and bottom edges. In the center, there is a faint, circular graphic of a globe with latitude and longitude lines.

BILL NYE HEAT VIDEO

HOW ARE ENERGY AND TEMPERATURE RELATED?

- **TEMPERATURE IS THE MEASURE OF THE AVERAGE KINETIC ENERGY OF PARTICLES.**
- **THERMAL ENERGY IS THE TOTAL KINETIC ENERGY OF PARTICLES.**



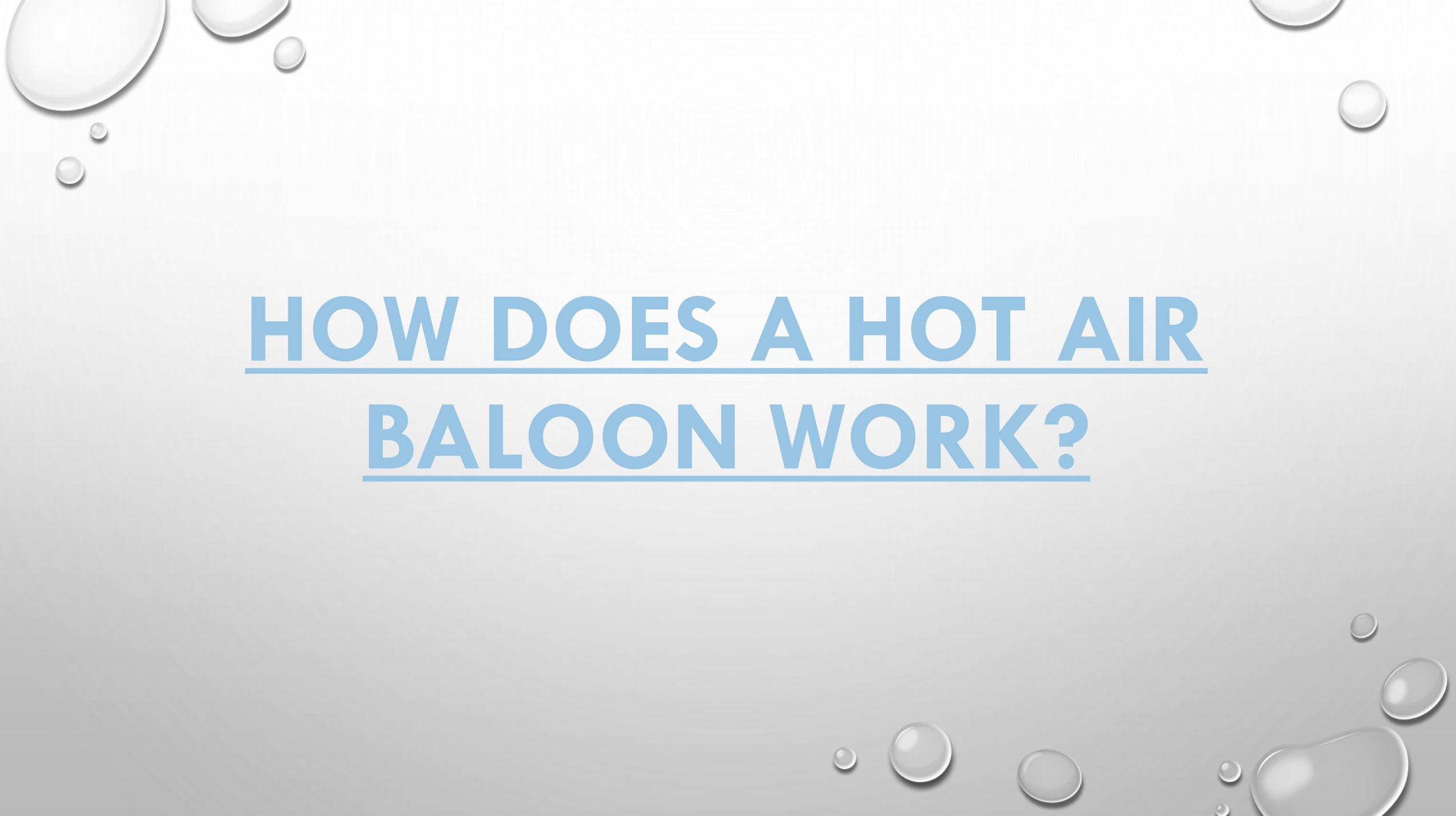
Which has more THERMAL ENERGY?

WHAT IS THERMAL EXPANSION?

- **THE MORE ENERGY, THE FARTHER APART THE PARTICLES WILL MOVE APART.**
- **MOST OBJECTS WILL EXPAND WHEN HEATED AND CONTRACT WHEN COOLED.**

- **THERMAL EXPANSION CAUSES A CHANGE IN DENSITY.**

MASS	VOLUME	DENSITY
100 kg	100 cm ³	1 kg/cm ³
100 kg	200 cm ³	.5 kg/cm ³



HOW DOES A HOT AIR BALLOON WORK?

WHAT IS HEAT?

- **ENERGY THAT IS TRANSFERRED BETWEEN OBJECTS THAT ARE AT DIFFERENT TEMPERATURES.**
- **ENERGY ALWAYS TRANSFERS FROM A HIGHER TEMPERATURE TO A LOWER TEMPERATURE OBJECT.**

WHY CAN TEMPERATURES OF LAND, AIR, AND WATER DIFFER?

- **LAND WILL WARM UP AT A FASTER RATE THAN WATER AND AIR DO.**

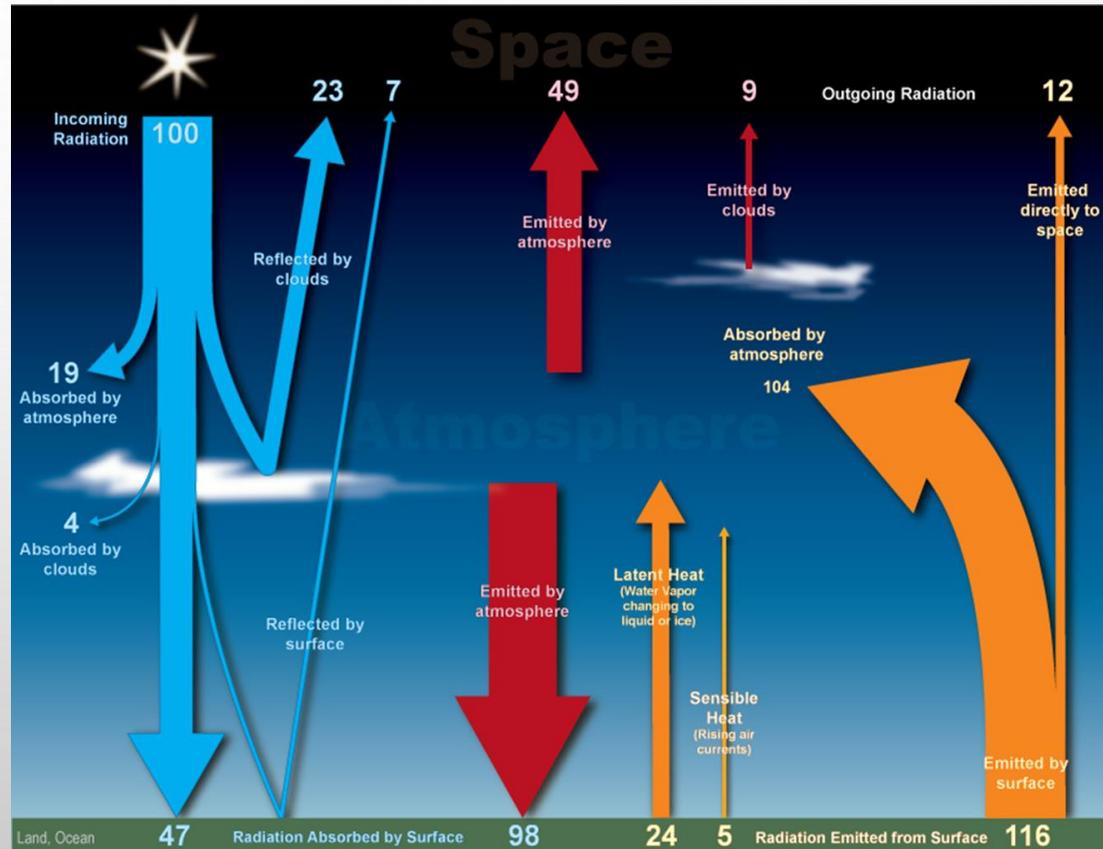
WHAT IS SPECIFIC HEAT?

- **DIFFERENT RATES IN WHICH MATERIALS BECOME WARMER OR COOLER.**
- **OBJECTS THAT REQUIRE A LOT OF ENERGY TO HEAT HAVE A HIGHER SPECIFIC HEAT THAN THOSE THAT REQUIRE LESS ENERGY. EXAMPLE: WATER HAS A HIGHER SPECIFIC HEAT THAN LAND SO IT WILL HEAT UP MORE SLOWLY.**

HOW IS ENERGY TRANSFERRED BY RADIATION?

- **RADIATION IS TRANSFERRED AS ELECTROMAGNETIC WAVES.**
- **WARMTH FROM THE SUN, VISIBLE LIGHT AND RADIO WAVES ARE EXAMPLES OF ELECTROMAGNETIC WAVES.**
- **EM WAVES DO NOT NEED A MEDIUM**

WHERE DOES RADIATION OCCUR ON EARTH?

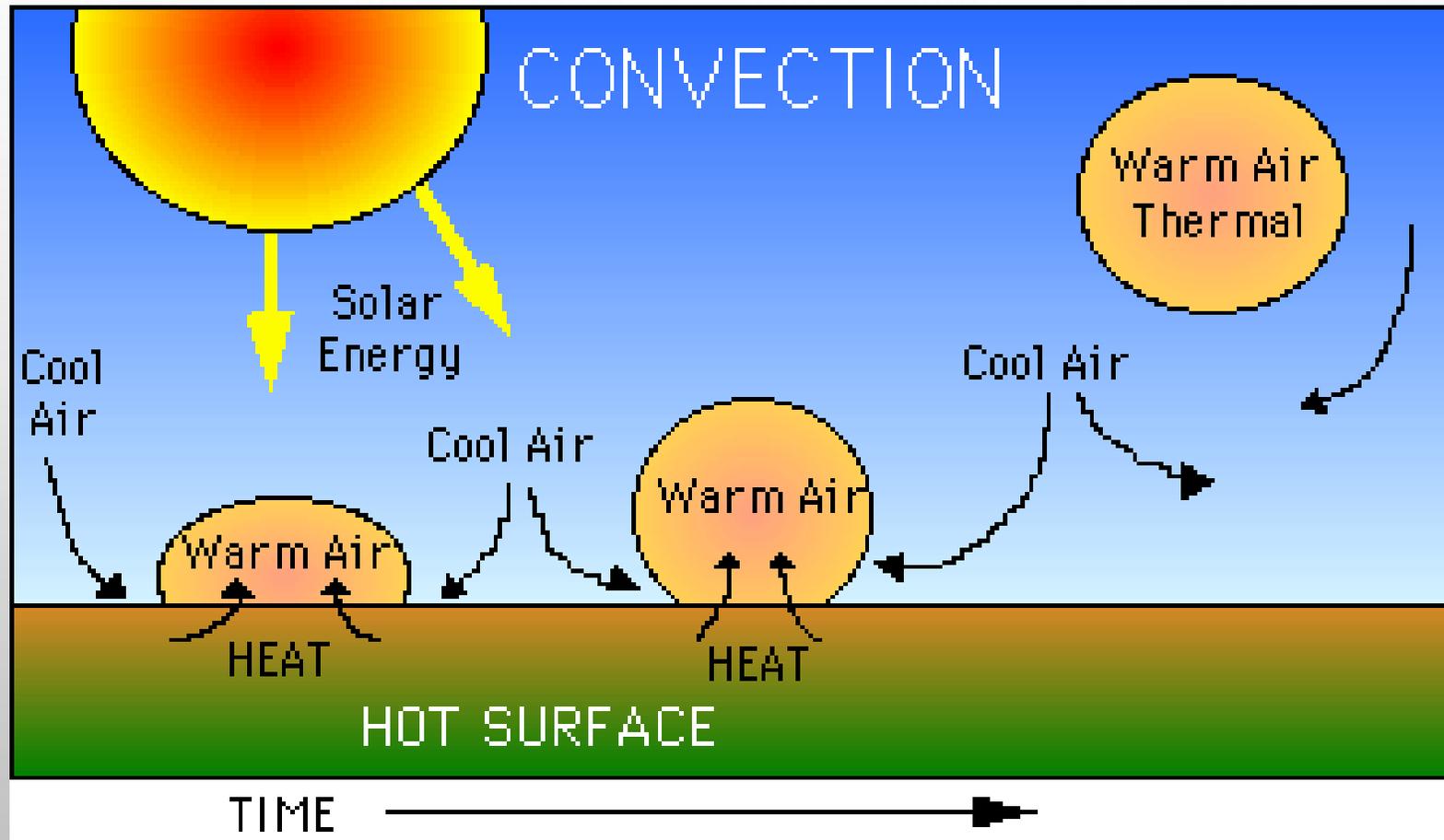




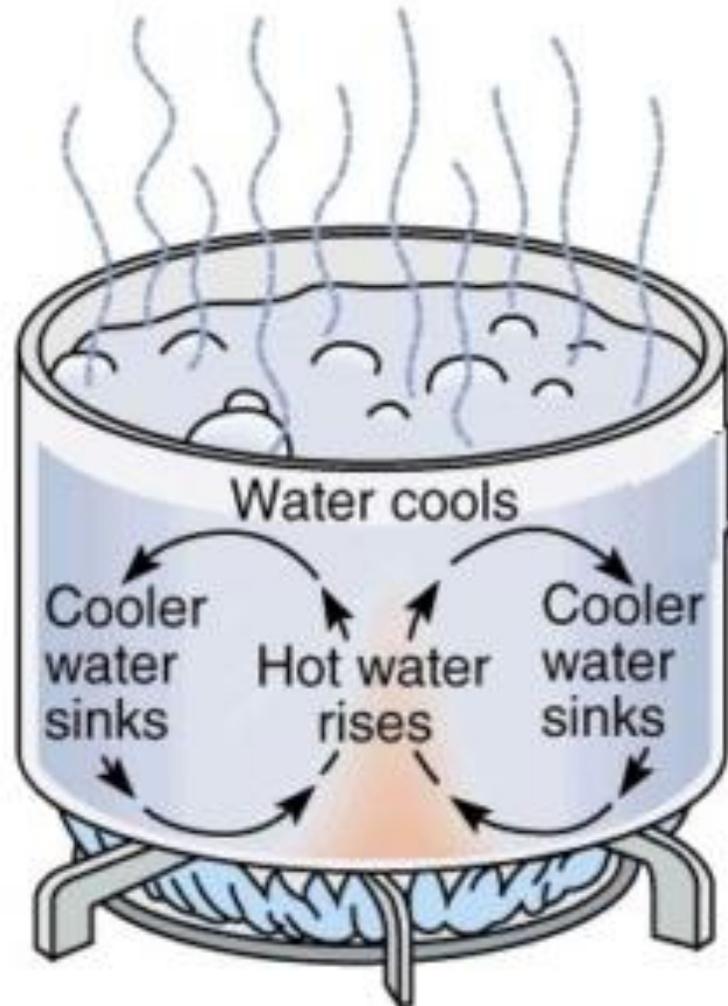
HOW IS ENERGY TRANSFERRED BY CONVECTION?

- **CONVECTION IS ENERGY TRANSFERRED THROUGH THE MOVEMENT OF MATTER.**
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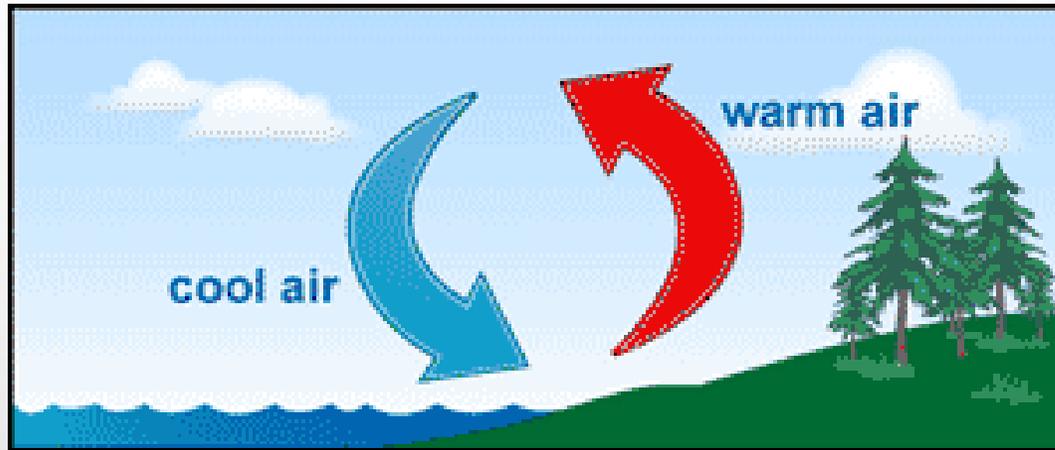
Convection



CONVECTION CURRENTS



WHERE DOES CONVECTION OCCUR ON EARTH?

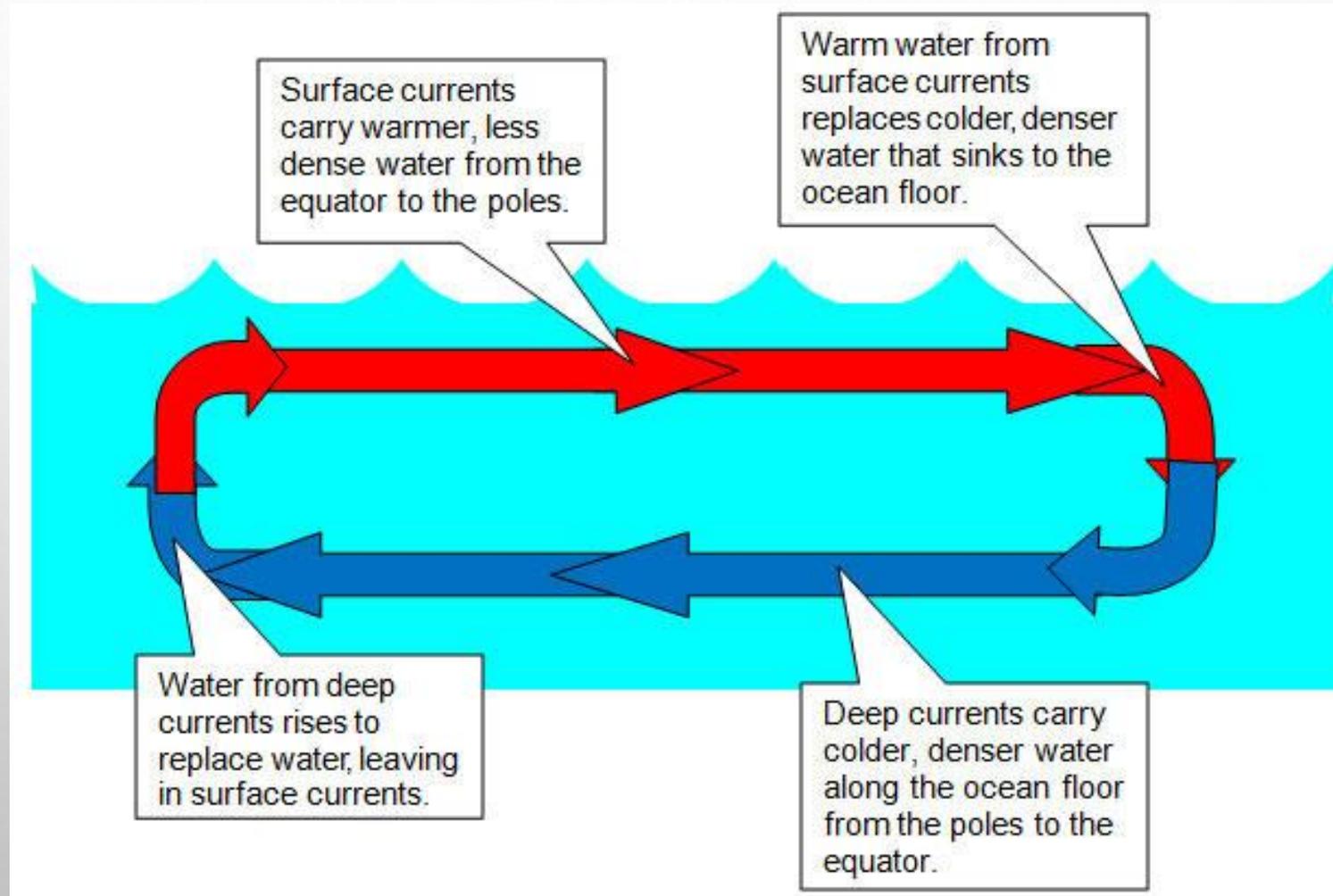


DAY TIME

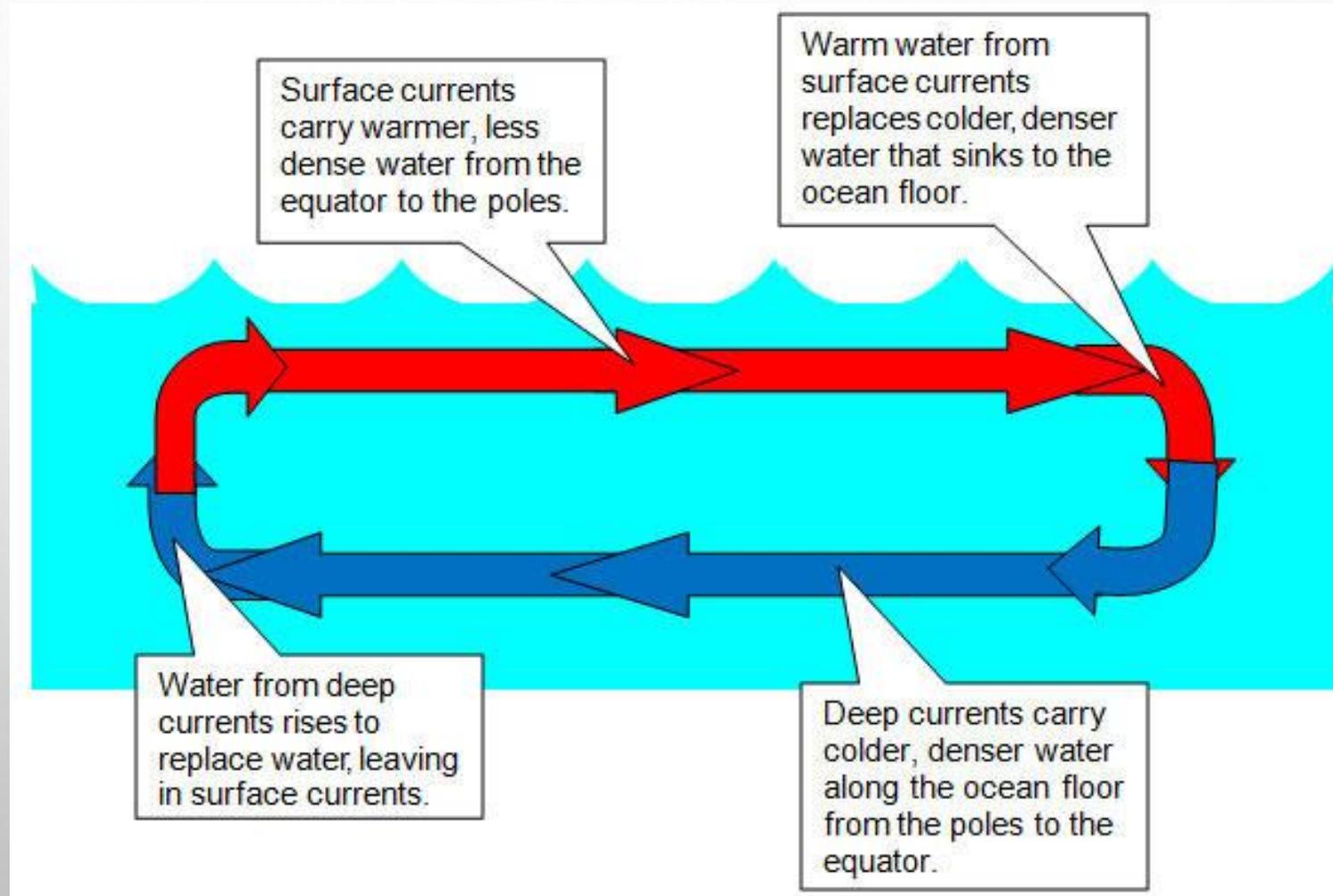


NIGHT TIME

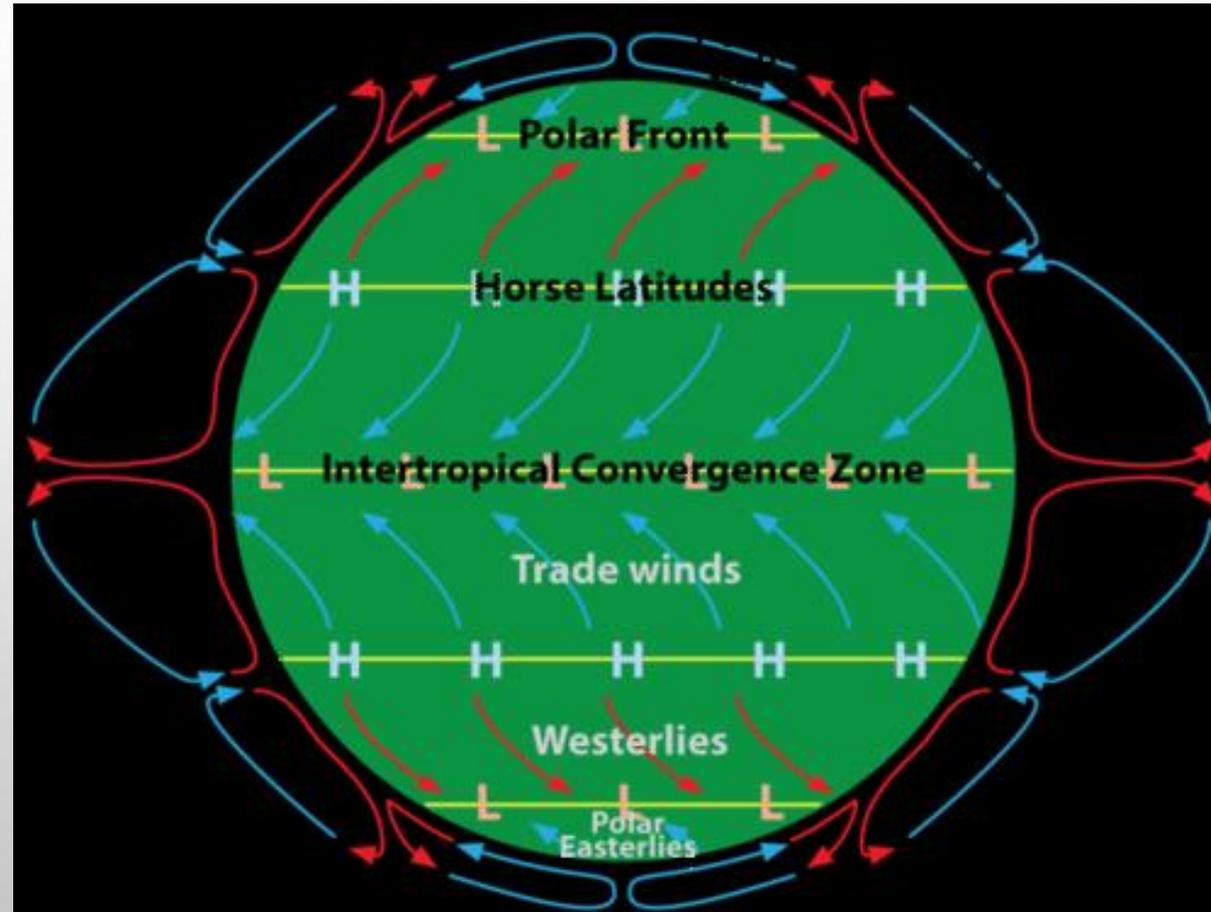
WHERE DOES CONVECTION OCCUR ON EARTH?



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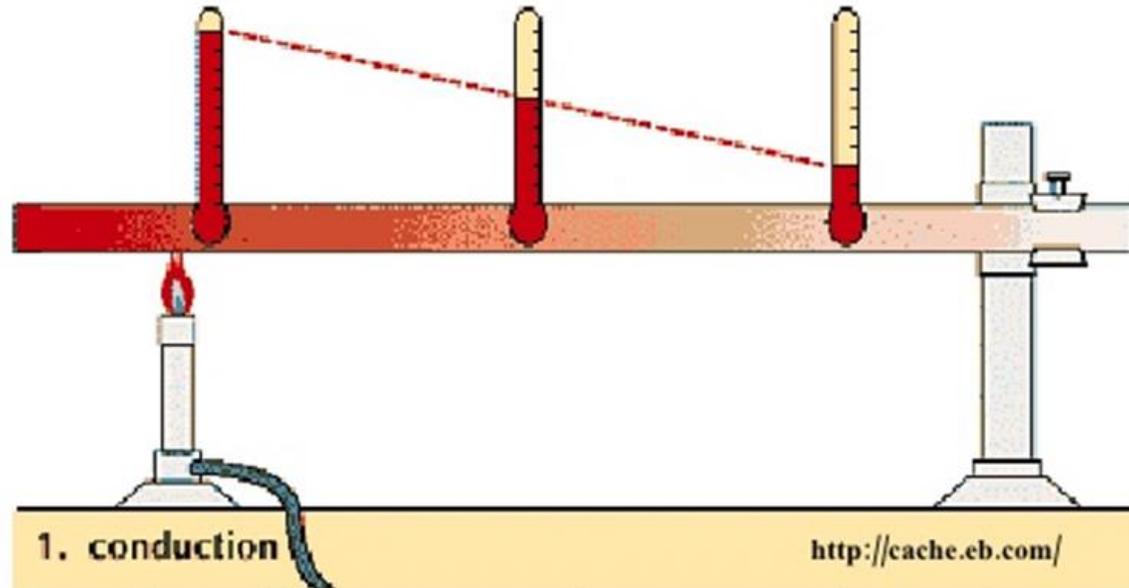
WHERE DOES CONVECTION OCCUR ON EARTH?



HOW IS ENERGY TRANSFERRED BY CONDUCTION?

- **ENERGY TRANSFER FROM ONE OBJECT TO ANOTHER OBJECT THROUGH DIRECT CONTACT.**

Conduction



Heat is transferred from atoms that are touching. It is not carried by a liquid or gas.

Example: You walk on a hot sidewalk barefooted and your feet get hot. The heat is moving from the atoms of the sidewalk to your feet.

[Video segment on conduction](#)

WHERE DOES CONDUCTION OCCUR ON EARTH?

- WHEN COOLER AIR MOLECULES COME IN CONTACT WITH THE WARM GROUND.**
- IF AIR PARTICLES TRANSFER ENERGY TO LIQUID WATER, EVAPORATION WILL OCCUR.**
- IF WATER VAPOR TRANSFERS ENOUGH ENERGY INTO THE AIR, WATER DROPLETS DEVELOP.**

