Heat Transfer in the Atmosphere

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CHAPTER 1

Heat Transfer in the Atmosphere

Can you see energy moving?

It's hard to see energy moving. But energy is the reason that air moves, and it is sometimes possible to see that. In this photo, differences in temperature are causing air to move—in fantastic ways!

How Energy Moves Through the Atmosphere

Energy travels through space or material. Heat energy is transferred in three ways: radiation, conduction, and convection.

Radiation

Radiation is the transfer of energy by waves. Energy can travel as electromagnetic waves through air or empty space. The Sun's energy travels through space by radiation. After sunlight heats the planet's surface, some heat radiates back into the atmosphere.

Conduction

In **conduction**, heat is transferred from molecule to molecule by contact. Warmer molecules vibrate faster than cooler ones. They bump into the cooler molecules. When they do, they transfer some of their energy. Conduction happens mainly in the lower atmosphere. Can you explain why?

Convection

Convection is the transfer of heat by a current. Convection happens in a liquid or a gas. Air near the ground is warmed by heat radiating from Earth's surface. The warm air is less dense, so it rises. As it rises, it cools. The cool air is dense, so it sinks to the surface. This creates a convection current (**Figure** 1.1). Convection is the most important way that heat travels in the atmosphere.

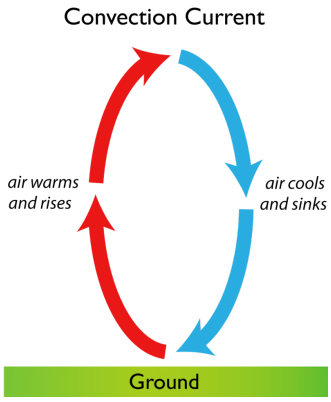

FIGURE 1.1

Convection currents are the main way that heat moves through the atmosphere. Why does warm air rise?

MEDIA

Click image to the left or use the URL below.
URL: https://www.ck12.org/flx/render/embeddedobject/93824

Summary

- In conduction, heat moves from areas of more heat to areas of less heat. The substances must be in direct contact.
- In convection, materials move depending on their heat relative to nearby materials.
- In radiation, energy moves by waves.

Review

1. What is moving in conduction?
2. What is moving in convection?
3. What is radiation?

References

1. Hana Zavadska. Diagram of a convection current . CC BY-NC 3.0