Warm Up Experiment

Explore the albedo effect on Earth with this simple experiment!

Materials Needed:

2 pieces of paper or fabric: one black and one white. Access to a sunny windowsill or incandescent desk lamp. *Optional:* Thermometer, paper or fabric in additional colors, cups of water.

Instructions:

Ask your child(ren) make a guess about which color of paper or fabric will absorb more heat from the Sun. Place your black and white pieces of paper or fabric in the Sun or under the desk lamp for 30 minutes to 1 hour. Come back and feel which one is warmest. Touch the material with the underside of your wrists or your cheeks to feel the difference in heat more easily.

Did one color heat up more than the other? Was your guess correct? Why do you think it happened this way?

Extensions:

- Use a thermometer to measure the temperature of each piece of paper or fabric.
- Wrap a piece of black paper around one cup of water, and a piece of white paper around another. See which water cup warms up fastest.
- Go on a scavenger hunt for warm surfaces in the Sun. Try to find a variety of colors: green, brown, blue, etc.
- What else could you warm up or keep cool? Design your own experiments!

These experiments are an introduction to the concept of *albedo*: how the Earth reflects some of the Sun's heat back into space.

UNIVERSITY OF ALASKA MUSEUM OF THE NORTH

Earth's Albedo and the Sun

Sunlight determines seasons and climates around the Earth. *Albedo* is the measure of how much of the sunlight is reflected.

Image: Wikimedia Commons.

The Earth reflects about 30% of the Sun's energy. The high albedo of light surfaces, such as snow and ice, reflects more of the sunlight (84%). The low albedo of darker surfaces, such as forests and oceans, absorbs most of the sunlight and reflects much less (14%). Albedo is an important way Earth keeps its climate systems in balance.

Albedo is important to our comfort and survival as a species. On a warm summer day, walking in a parking lot can feel very hot compared with walking in a park with trees. In the Arctic, indigenous people rely on ice to hunt and fish through the winter, as the high albedo of ice helps keep it frozen.

Image: Libreshot.

In recent times, human activity has rapidly increased the amount of carbon in the atmosphere. Carbon traps more heat in the atmosphere. This extra heat has begun to change the usual climate and landscapes of places on Earth.

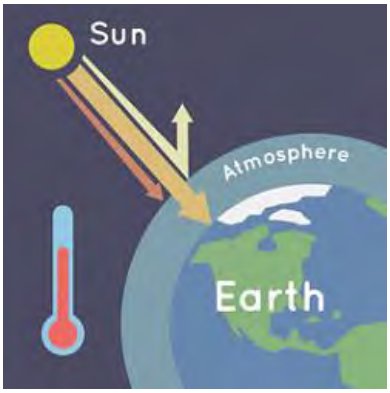

Image: NASA Climate Kids.

With climate change in mind, NASA scientists are studying the Earth's ability to reflect the Sun's energy. Although the Earth's overall albedo has not changed significantly in the last two decades, different regions are changing in their ability to reflect heat. The Arctic is losing ice cover and absorbing more heat, while Antarctica is reflecting more sunlight as precipitation and snow cover has increased in that region. Earth's changing landscapes also change in their ability to reflect or absorb the Sun's heat.

Information from NASA Earth Observatory:
earthobservatory.nasa.gov/images/84499/measuring-earths-albedo