Atmo Sci **NAME:**

Albedo Lab

Introduction

The albedo of an object is a measure of how strongly that object reflects light from light sources such as the Sun. It is believed that the Earth's average albedo is 30% or 0.30. Energy in the form of visible radiation (light) from the Sun warms the Earth. Some of energy from the Sun is reflected back into space while some of the energy is absorbed. Clouds, snow, ice, and particles or pollutants in the atmosphere can all reflect energy back into space (or down to the Earth's surface). The part that is absorbed by the Earth warms the surface, which then re-radiates energy (Infrared) back into space. The hotter the Earth's surface, the more energy is radiated out.

In general, lighter colored objects tend to have a higher albedo, meaning they reflect more energy, while darker colored objects tend to have a lower albedo, meaning they absorb more energy. If the Earth receives more energy from the Sun that it sends back to space, the Earth gets warmer. If the Earth reflects more of the Sun's energy than it absorbs, the Earth gets colder.

The classic example of the albedo effect is the snow-temperature feedback. If a snow-covered area warms and the snow melts, the surface becomes darker and the albedo decreases. As a result, more sunlight is absorbed, and the temperature tends to increase. In comparison, if snow forms, the surface gets lighter, thus reflecting more energy. As a result, more sunlight is reflected and temperatures tend to cool. This creates "positive feedback" in which the more a surface warms, the darker it becomes, and the warmer it gets. This can also be referred to as a "run-away" cycle.

Objective

In this experiment, you will investigate how the color of a surface influences its ability to reflect or absorb heat.

Materials

LabQuest
Infrared Thermometer
Soil Samples
Surface temperature probe
Clamp Lamp with 100 W bulb.

Procedure

1. You will analyze your own soil sample as well as two additional ones.
2. Connect your surface temperature probe to LabQuest. You may also opt to use the infrared thermometer. Choose New from the File menu.
3. On the Meter screen, tap Length. Change the data collection length to 300 seconds. Select OK. Data collection will last 5 minutes.
4. Attach your clamp lamp to the ring stand.
5. Please your soil sample on the plastic dish directly below the lamp.
6. Place the surface temperature probe on top of your soil sample (or record the initial surface temperature using the infrared thermometer).
7. Turn on the lamp and let the data collection continue for five minutes.
8. When the data collection is finished, record the final surface temperature and turn off the lamp.

Data

Location	Initial Surface Temperature	Final Surface Temperature
1		
2		
3		

Data Analysis

1. Which location had the greatest increase in surface temperature? Which location had the smallest increase in surface temperature?
2. Which location reflected more "solar radiation?" Which location absorbed more "solar radiation?
3. Does the color of the soil sample appear to influence the change in surface temperature?
4. Does the location with the greatest increase in surface temperature have the lowest albedo? Remember, the albedo is the proportion of incident light that is reflected by a surface. More reflective surfaces have higher albedos.
5. Which soil sample do you predict will cool the fastest? Explain your reasoning.