



What Does Landsat Measure? Modeling reflectance with foil and paper

Landsat measures how light from the visible and infrared portions of the electromagnetic spectrum reflect off Earth's surfaces. Each surface reflects different wavelengths in the electromagnetic spectrum at different intensities. Landsat sensors catch this light and use it to see Earth's surface. With this easy to make demonstration, see how much reflects from different surfaces.

What you Need:

- 1 large shoebox with lid
- Aluminum foil
- Black construction paper
- White paper
- Flashlight
- Glue
- Black spray paint
- Scissors
- Tape (optional)

Preparing your demonstration:

1. Spray paint the inside of your shoebox and the inside of the lid black. Wait for it to dry. This may take up to 24 hours.



2. Once the paint is dry, cut the aluminum foil to cover 1/3 of the bottom of your box and glue the foil down on one of the narrow sides of the box.

3. Cut the white paper so that it covers 1/3 of the bottom of your box and glue the paper to the bottom of the box next to the aluminum foil.

4. Cut the black construction paper so that it covers 1/3 of the bottom of the box and glue the paper next to the white paper and the edge of the box.



5. If your shoebox has a lid that is connected to the bottom of your box you can skip this step. If your box has a separate lid, the lid should be attached to the box, near the back. To do this, cut along the corner of the lid until you reach the top of the lid. Repeat this on the other corner of the lid on the long side of the lid. This flap will become your hinge. Using, tape or glue fasten the flap to the edge of the box, creating a box with a lid that is connected to the box.

Congratulations you have constructed your reflectance box! Now it's time to see what's going on.



1. Turn your flashlight on and open your box just wide enough for you to peer inside and for you to fit the bright end of your flashlight inside.
2. Point the flashlight at the black construction paper and look at the top of the inside of the box. How bright did the inside of the box appear?
3. Point the flashlight at the white construction paper and look at the top of the inside of the box. How bright did the inside of the box appear?
4. Point the flashlight at the aluminum foil and look at the top of the inside of the box. How bright did the inside of the box appear?

What's Going On?

When a light shines on a surface the surface either absorbs or reflects the light, bouncing it off the surface. It's like when you bounce a ball off the ground. The ground returns the ball back to you. If you tried to bounce a ball on carpet, the ball may not bounce back very much. However, if you bounce the ball on a basketball court the ball will bounce back quite a bit.

The same thing happens with light. Some surfaces bounce or reflect light better than others. Shiny surfaces like mirrors, aluminum foil, water, clouds, or snow reflect a lot of light. This is why when you shined your flashlight at the aluminum foil the inside of the box got really bright. Dark surfaces like the black construction paper, dirt, or asphalt don't reflect light as much. Dark surfaces tend to absorb more light than they reflect. This is why the inside of the box appeared the darkest when you were shining the light at the black construction paper. Other surfaces reflect some light but not a lot, like the white paper.

The light from your flashlight is called white light and it is made up of all the different colors of the rainbow. When all of these colors of light combine, they make white light. When you see a rainbow the different colors have separated from passing through an object that bends light, like raindrops or a prism. This is what makes the rainbow. These different colors are absorbed by some surfaces and reflected by others. For example, green leaves absorb most of the colors of the rainbow except for green, which is reflected. Whatever light the surface reflects is the color that we see. That is why leaves are green.

The sun is like a giant flashlight shining down on the many surfaces on Earth. Some of the light is reflected back into space, where satellites, like Landsat catch the reflected light and measure it to see what is below them on Earth's surface.