My NASA Data - Mini Lesson/Activity

Analyzing Cloud Effects on Earth’s Energy Budget

Grade Band

- 9-12

Time

- 15 minutes

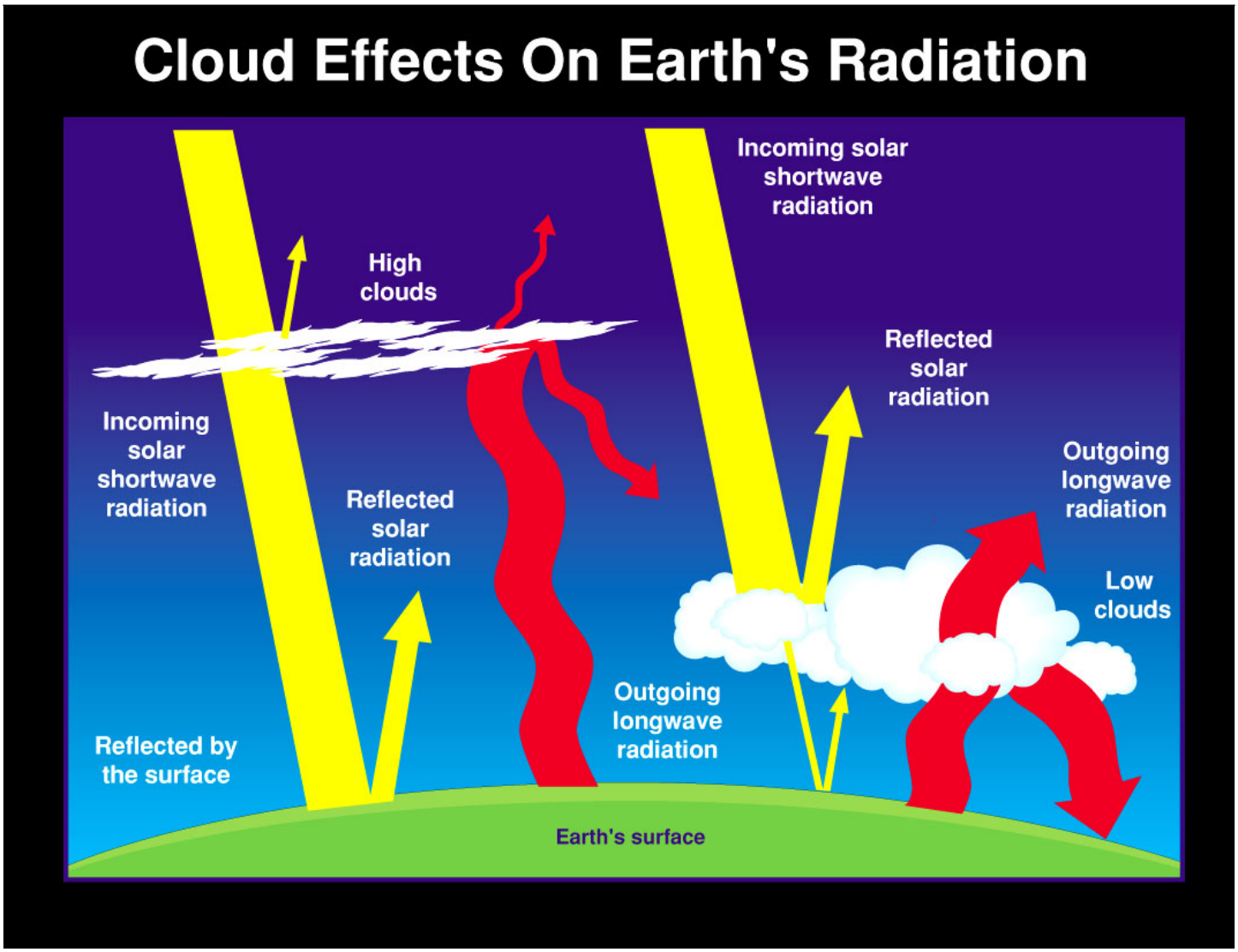
Overview

Students analyze diagrams showing the effects of clouds on Earth’s Radiation and answer the questions that follow. This mini lesson is designed to help students analyze the interaction between clouds and Earth's incoming and outgoing energy.

Student Directions

Clouds affect Earth's climate in two major ways. First, they are an essential part of the water cycle. Clouds provide an important link between rain and snow, oceans and lakes, and plants and animals. Secondly, clouds also have an important (yet complicated) effect on Earth’s temperature because of their complex role in the Earth's radiation budget. *Clouds can both cool down and warm up the temperatures on Earth.*

Analyze the diagrams showing the effects of clouds on Earth’s Radiation and answer the questions below.

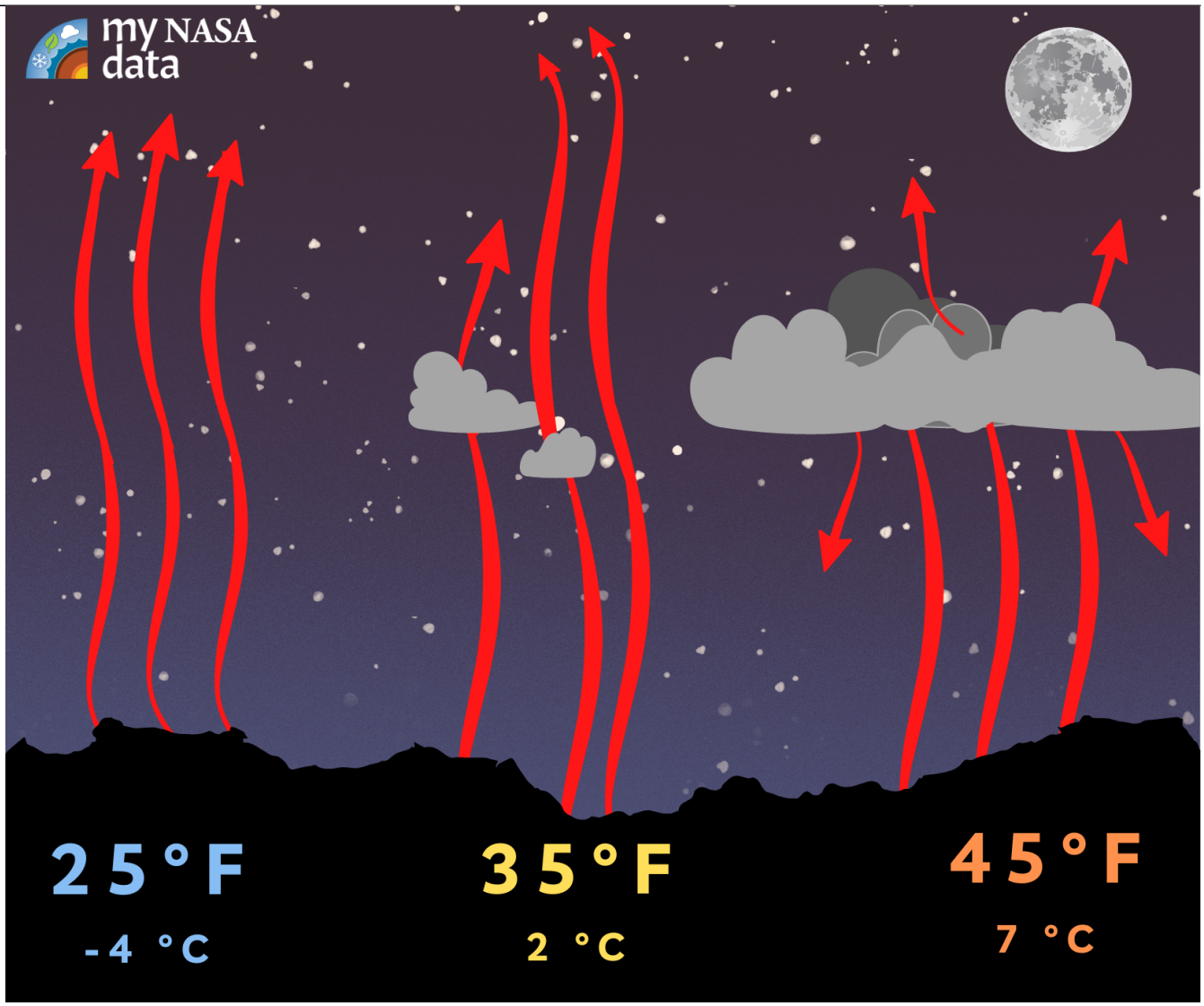


Cloud Effects on Earth's Radiation, Credit: NASA Visible Earth

Steps:

1. Check with your instructor on how to submit your answers.
2. What effect do high clouds have on surface temperatures?
3. What effect do low clouds have on surface temperatures?

4. Compare the first diagram with the diagram below. How is the effect of cloud coverage different from day and night?



Temperature changes at nightly cloud coverage. Credit: My NASA Data

5. Make a claim about the effect of all clouds together and their impact on Earth's temperatures and your evidence to support your claim.
6. As global air temperatures continue to rise, how do you think this will affect clouds?

Sources:

1. Cloud Effects on Earth's Radiation. (2000, April 18). NASA Visible Earth. Retrieved August 3, 2022, from https://visibleearth.nasa.gov/images/54219/cloud-effects-on-earths-radi…

Teacher Note

Teachers, these mini lessons/student activities are perfect "warm up" tasks that can be used as a hook, bell ringer, exit slip, etc. They take less than a class period to complete. Learn more on the "My NASA Data What are Mini Lessons?" page.

Teachers who are interested in receiving the answer key, please complete the Teacher Key Request and Verification Form. We verify that requestors are teachers prior to sending access to the answer keys as we've had many students try to pass as teachers to gain access.

NGSS Three Dimensional Learning

NGSS Disciplinary Core Ideas

- PS4B: Electromagnetic Radiation
- ESS2A: Earth Materials and Systems

Crosscutting Concepts

- Cause and Effect

Science and Engineering Practices

- Constructing Explanations and Designing Solutions
- Obtaining, Evaluating and Communicating Information