My NASA Data - Mini Lesson/Activity

Clouds & Earth's Climate with Dr. Patrick Taylor Video

Grade Band

- 6-8
- 9-12

Time

- 30 minutes

Overview

Students watch a video and answer questions on Dr. Patrick Taylor (Atmospheric Scientist, NASA Langley Research Center) as he discusses the study of clouds and Earth's energy budget by analyzing data from Low Earth Orbit satellites.

Student Directions

This video, Clouds & Earth's Climate, introduces Dr. Patrick Taylor, an Atmospheric Scientist from NASA Langley Research Center. He discusses his role in studying clouds and Earth's Energy Budget by analyzing data from low Earth orbit satellites. He also discusses the different effects of clouds on the energy budget.

Complete the questions as you watch the video.

Video: Clouds & Earth's Climate - Patrick Taylor

Clouds & Earth's Climate - Patrick Taylor | https://www.youtube.com/watch?v=Y8DMPSBHXo0 | Source: The GLOBE Implementation Office

Steps:

1. Check with your instructor on how to submit your answers.
2. How much has Earth's mean surface temperature warmed over the last 130 years?
3. How does the CERES (Clouds and the Earth's Radiant Energy System) project produce global climate data records of Earth's energy budget and clouds over many decades?
4. Why is Earth's energy budget important for climate?
5. If less sunlight is absorbed than infrared energy is emitted to space, what will the effect be on Earth's temperature?
6. If more sunlight is absorbed than infrared energy is emitted to space, what will the effect be on Earth's temperature?
7. According to the animation of CERES data showing where Earth cools by losing infrared energy to space, which regions lose the **most** energy to space?
8. Where is the **least** infrared energy lost to space?
9. According to the animation showing CERES observations of reflected sunlight from Earth, where are the areas with the **least** reflected sunlight?
10. According to the animation showing CERES observations of reflected sunlight from Earth, where are the areas with the **most** reflected sunlight?
11. What are two possible effects that clouds have on the energy budget?
12. Why does NASA study clouds and their role in Earth's energy budget?

Optional: Learn how Dr. Taylor found his passion for weather when he was in fourth grade at Greenwood Elementary School in Millerstown, Pennsylvania.

Sources:

1. Clouds & Earth's Climate - Patrick Taylor. (2021, June 15). YouTube. Retrieved August 11, 2022, from https://www.youtube.com/watch?v=Y8DMPSBHXo0

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.

What NASA Career Uses These Data?

Atmospheric Scientist - Atmospheric scientists study the weather and climate and examine how those conditions affect human activity and the earth in general. Most atmospheric scientists work indoors in weather stations, offices, or laboratories. Occasionally, they do fieldwork, which means working outdoors to examine the weather. Some atmospheric scientists may have to work extended hours during weather emergencies.

NGSS Three Dimensional Learning

NGSS Disciplinary Core Ideas

- PS4B: Electromagnetic Radiation
- ESS2A: Earth Materials and Systems
- ESS2D: Weather and Climate

Crosscutting Concepts

- Cause and Effect
- Systems and System Models

Science and Engineering Practices

- Developing and Using Models
- Analyzing and Interpreting Data

Document Resources

- Clouds & Earth's Climate - Patrick Taylor video transcript
- Clouds & Earth's Climate - Patrick Taylor video - Student Questions