My NASA Data - Mini Lesson/Activity

Clouds & Earth's Climate with Dr. Patrick Taylor Video (Student Activity)

Student Directions

Dr. Patrick Taylor (Atmospheric Scientist, NASA Langley Research Center) discusses how he studies 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.
1. How much has Earth’s mean surface temperature warmed over the last 130 years?
2. 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?
3. Why is Earth’s energy budget important for climate?
4. If less sunlight is absorbed than infrared energy is emitted to space, what will be the effect on Earth’s temperature?
5. If more sunlight is absorbed than infrared energy is emitted to space, what will be the effect on Earth’s temperature?
6. 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?
7. Where is the least infrared energy lost to space?
8. According to the animation showing CERES observations of reflected sunlight from Earth, where are the areas with the least reflected sunlight?
9. According to the animation showing CERES observations of reflected sunlight from Earth, where are the areas with the most reflected sunlight?
10. What are two possible effects that clouds have on the energy budget?
11. 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.

Teachers, these mini-lessons/student activities are perfect "warm-up" tasks that can be used as a hook, bellringer, exit slip, etc.

Teachers who are interested in receiving the answer key, please contact MND from your school email address at larc-mynasadata@mail.nasa.gov. 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. To receive the keys please provide the following:

1. The link to the school/institution’s teacher directory where you are employed so we can verify that you are a teacher
2. Ensure that the school email address is provided in your response as we are unable to send to personal email accounts

Access and Explore Data

- Monthly Flow of Energy into Surface by Longwave Radiation (Watts per square meter)
- Monthly Flow of Energy into Surface by Shortwave Radiation (Watts per square meter)
- Monthly Flow of Energy out of Surface by Longwave Radiation (Watts per square meter)
- Monthly Flow of Energy out of Surface by Shortwave Radiation (Watts per square meter)