
My NASA Data - Lesson Plans

Earth System Satellite Images - Analyzing One Image



Overview

The Earth System Satellite Images available on My NASA Data provide teachers and students opportunities to explore data and identify relationships between/among different components of the Earth system. The Earth System Satellite Images, along with the Data Literacy Cubes, help the learner visualize how different Earth system variables change over time, establish cause and effect relationships for a specific variable, identify patterns, and determine relationships among variables.

In this lesson, students will focus on *one image*.

This lesson has been adapted and modified from the [GLOBE Earth System Poster Learning Activities](#).

Learning Objectives

The learners will be able to:

- Discover, analyze, and interpret patterns in a graphic display of data

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- Conduct an analysis of mapped data
 - Develop descriptions and explanations using evidence

Why Does NASA Study This Phenomenon?

Studying how Earth's systems interact is as important as studying the individual systems. NASA and its international partners operate several Earth-observing satellites, collectively called the A-Train, that closely follow one after another along the same orbital track. The near-simultaneous observations of a wide variety of factors help the scientific community advance our knowledge of Earth-system science and apply this knowledge for the benefit of society. Source: [NASA 60 Years and Counting](#).

Essential Questions

- What information do maps give us so that we can analyze and interpret them?

Materials Required

- 2021 Earth System Satellite Images ([Global](#) or [North America](#))
- [Data Literacy Cube Template](#) or number cube (1 per group)
- [Data Literacy Map Question Sheets](#) (1 per student)
- [Task Cards](#)
- Pen, Pencil

NOTE: Consider laminating the resources in this list for future use.

Technology Requirements

- Standalone Lesson (no technology required)
- Internet Required

Teacher Background Information

The processes comprising the Earth's environment are interconnected. Understanding how these connections operate on a global scale is to understand the Earth as a system. Understanding the Earth as a system requires a quantitative exploration of the connections among various parts of the system. These processes take place in and between the atmosphere, oceans, fresh water, ice, soil, and living components. These processes also include energy from the Sun, and the gases and particles that enter the atmosphere and oceans from both natural and anthropogenic, or human-caused, sources. The activities in this guide will help students understand variations in environmental parameters by examining connections among different phenomena measured on local, regional and global scales. As students look at the connections between environmental data, they will see that the environment is the result of the interplay among many processes that take place on varying time and spatial scales. They will also understand that environmental processes are not bound by oceans, mountains, or country delineations—they are truly global in scope.

Source: [The GLOBE Earth System Poster Learning Activities](#).

Prerequisites Student Knowledge

Students need to be familiar with longitude and latitude, as well as familiarity with qualitative and quantitative observations.

Procedure

Teacher preparation before the lesson:

1. There are sets of six satellite image cards, one for every other month in a year, for each Earth system variable as listed below.
 - Aerosols
 - Cloud Cover
 - Insolation (incoming solar radiation)
 - Precipitation
 - Surface Skin Temperature
 - Vegetation
2. Print copies of only **ONE image** from the Earth System Satellite Images (Global or North America) for each group.
3. Print one Data Literacy cube template for each group.
4. Print a map question sheet for each student.
5. There are four different map question sheets.
 - Question Sheets are leveled for both Lexile and English-language proficiencies.
 - The leveled question sheets contain labeled (bottom left) and unlabeled versions for you to use at your discretion to help you differentiate your instruction.
 - *Note:* The Lexile range provided on each question sheet represents the text's difficulty.
 - The students' reading comprehension levels should be taken into account when selecting the appropriate question sheet.
 - Regardless of level, the students in each group will be able to follow along, because the cube has the same six set of question categories: Examine, Search and Find, Analyze, Ask, Connect, and Assess.
 - Some of the question sheets include sentence stems to help struggling readers/writers participate in responding to the questions.

Part I. Using the Cube:

1. Divide the class into small groups. It is best to not have more than 6 students per group/team.
2. Each group will have:
 - One single image for the same month.
3. Distribute:
 - Map question sheet (for each student)
 - Cube for each group
 - Earth System Satellite Images (Global or North America)
4. *Optional:* Use the task card to assign their roles (project manager, data manager, chief engineer, and communications manager). Be creative and assign other roles!
5. Assign a person in each group to roll the cube.
6. In their groups, they will answer questions 1–6 on the map question sheet.

Part II. Close Lesson

1. To wrap up the activity, use 3-2-1 to check for comprehension. Ask students to answer the 3-2-1 Prompt.
 - **Three** things that they have learned from analyzing the map.
 - **Two** questions that they still have.
 - **One** aspect of class that they enjoyed.

Extensions

You can use the [Data Cube Question Sheets](#) as an extension or additional support for your students. If using the Data Question sheet, omit using question number 6. Use the data sheets as you see suitable for your class.