My NASA Data - Mini Lesson/Activity

Observing Annual Vegetation Changes

Grade Band

- 3-5
- 6-8
- 9-12

Time

- 30 minutes

Overview

Students observe monthly images of changing vegetation patterns, looking for seasonal changes occurring throughout 2017. These data can be used by students to develop their own models of change.

Student Directions

Plants are sensitive to their environment and serve as a good indicator whenever there is a change. Scientists use maps like the one below (and in the Google Slides) to measure the "greenness" of Earth's landscapes using a variable called **Normalized Difference Vegetation Index** (NDVI). These values indicate where and how much green leaf vegetation has grown for a particular period of time.
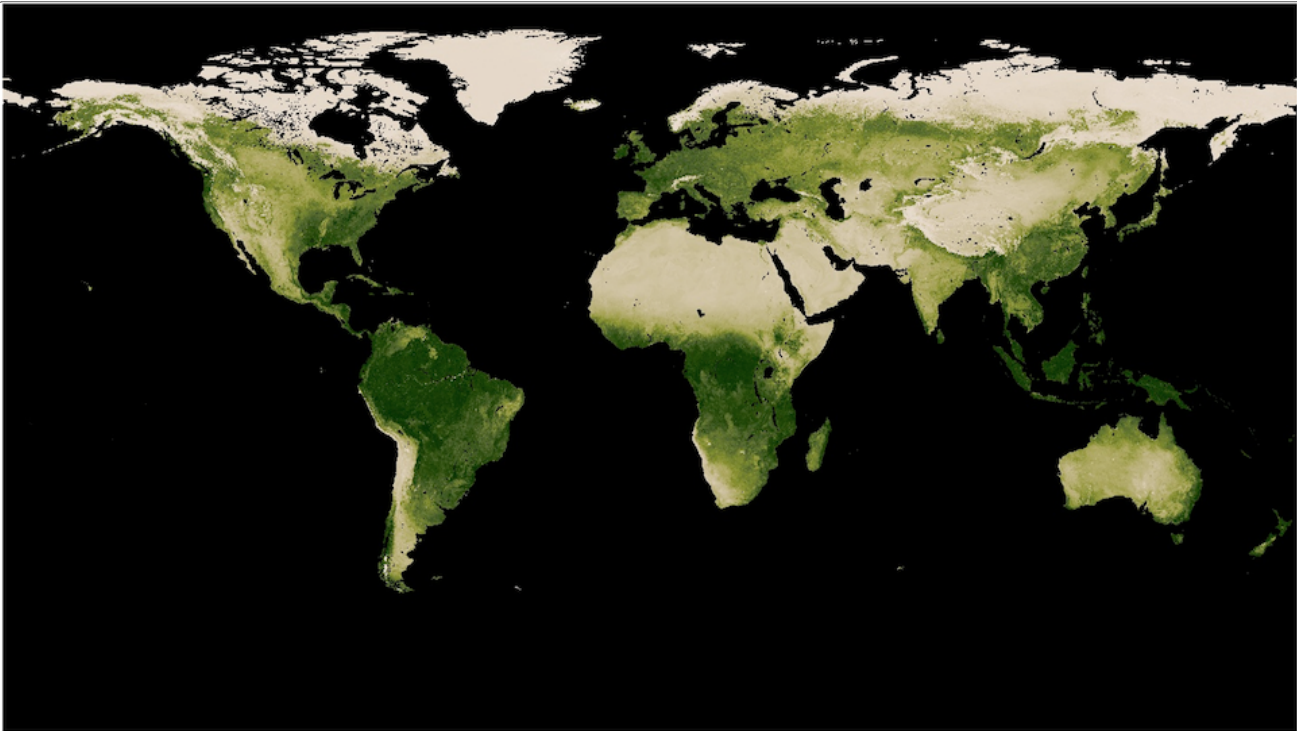
What do these data mean?

Dark green areas show where there was a lot of green leaf growth; light greens show where there was some green leaf growth; and tan areas show little or no growth. Black means "no data."

How are these data collected?

As can be seen through a prism, many different wavelengths make up the spectrum of sunlight. When sunlight shines on objects, certain wavelengths are absorbed and other wavelengths are reflected. The pigment in plant leaves—*chlorophyll*—strongly absorbs visible light for use in photosynthesis. The cell structure of the leaves, on the other hand, strongly reflects near-infrared light. (NOTE: Red light is part of visible light; infrared is not part of visible light.) The more leaves a plant has, the more these wavelengths of light are affected. Scientists apply this knowledge of plants' interactions with light to map the density of green vegetation across Earth's landscapes by designing satellite sensors to measure the wavelengths of red and near-infrared light that is absorbed and reflected by plants all over the world.

How are these data used?

Scientists routinely produce global NDVI maps to help them monitor and investigate shifts in plant growth patterns that occur in response to climate changes, environmental changes, and changes caused by humans. Farmers and resource managers also use NDVI maps to help them monitor the health of our forests and croplands. So these maps are used both for scientific research as well as societal benefit.

Students observe monthly images of changing vegetation patterns, looking for any changes that are

occurring throughout 2017.

Procedures:

1. Review the changes in vegetation over the course of 2017.
2. What do the colors represent?
3. What changes do you see through the year? What explanations can you suggest for these patterns?
4. Choose a location or region. During which months do you observe the high values? Low values? Why do these values change throughout the year?
5. Observe the entire map. Which regions experience both the highest and lowest values during the year?
6. Describe one region that does not change over the year. Brainstorm the factors that contribute to this limited change.

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

- ESS2A: Earth Materials and Systems
- ESS3A: Natural Resources

Crosscutting Concepts

- Patterns
- Stability and Change

Science and Engineering Practices

- Developing and Using Models
- Analyzing and Interpreting Data

Document Resources

- NDVI 2017

Google Slide interactive Files

[Observing Annual Vegetation Changes: Student Activity Mini Lesson Interactive S…](#)