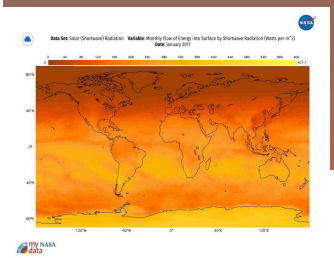
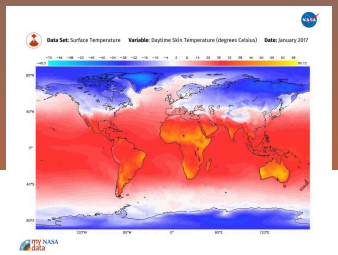
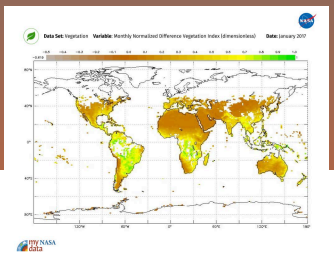
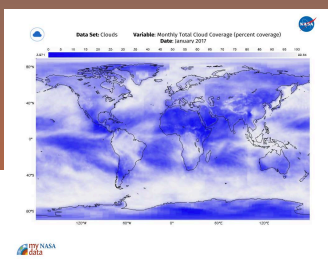
GLOBE Digital Earth System Poster

Implementing the NGSS Grades 6-8

http://mynasadata.larc.nasa.gov/globe/

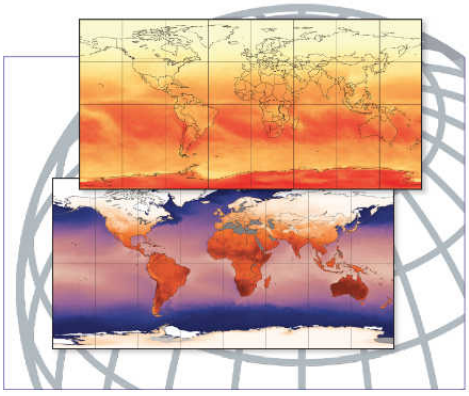





In the Classroom:

The GLOBE Digital Earth System Poster available on My NASA Data provides teachers and students opportunities to explore data and identify relationships between/among the different components of the Earth system. The animations and printable poster cards help the learner visualize how the different Earth science variables change over time, make comparisons between years to establish cause/effect relationships for a specific variable, identify patterns, and determine relationships between variables.

Teachers, consider using the Digital Poster, poster cards, and the Learning Activity Guide as tools to support NGSS Science Practices, Disciplinary Core Ideas, and Crosscutting Concepts as they relate to Earth Science Performance Expectations.

The GLOBE Earth System Poster Learning Activities



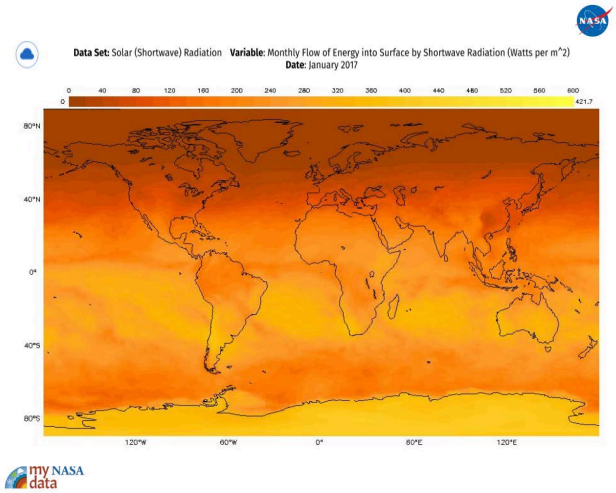
Activities to accompany the GLOBE Earth System Poster "Exploring Connections in Year 2007"

Visit https://mynasadata.larc.nasa.gov/
for Animations, Printable Poster Cards, Lesson Plans,
and the GLOBE Earth System Poster Card Activity Guide.

MS-ESS2-6

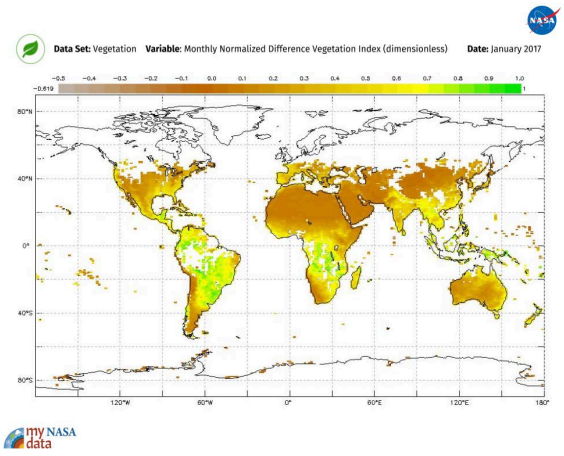
Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

- Students examine animations of surface temperature and solar (shortwave) radiation to develop an understanding of how the Earth is heating, how these variables change according to location, and how they change over time.
- Using their observations, students discuss the rotation of the Earth on its axis and the role this plays in the unequal distribution of heat on Earth.
- Next, students examine the animations to observe change in the oceans and discuss how the oceanic circulation patterns affect regional climates.
- Students analyze animations for different years to see if patterns of changes exist.
- Next, students investigate shifts in global temperatures or consistencies.
- Students are encouraged to ask questions based on the data they are observing.



MS-ESS3-5

Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.



- Students examine animations for each of the different variables (i.e., solar (shortwave) radiation, surface temperature, cloud cover, precipitation, aerosols, and vegetation).
- Working in small groups, students compare certain variables across different years to analyze change over time.
- Different student groups examine particular combinations of variables and then compare their findings with those of other groups.
- Based on their observations, students predict cause/ effect relationships for the changes they see occurring.
- Using the evidence they have gathered in their different groups, students formulate questions that can be used to promote further class discussion of global temperature changes, interactions they see occurring; and possible effects this will have on the different components of Earth's system.
- Students consider the factors associated with human activities that could be affecting the changes they observe in the animations.

6-8 NGSS Performance Expectations Using the GLOBE Interactive Poster:

MS-ESS2-6. Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models • Develop and use a model to describe phenomena. (MS- ESS2-6)	**ESS2.C: The Roles of Water in Earth's Surface Processes** • Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. (MS- ESS2-6) **ESS2.D: Weather and Climate** • Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns. (MS-ESS2-6) • The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents. (MS-ESS2-6)	**Systems and System Models** • Models can be used to represent systems and their interactions —such as inputs, processes and outputs—and energy, matter, and information flows within systems. (MS-ESS2-6)

MS- ESS3-5 Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Asking Questions and Defining Problems • Ask questions to identify and clarify evidence of an argument. (MS- ESS3-5)	**ESS3.D: Global Climate Change** • Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities. (MS-ESS3-5)	**Stability and Change** • Stability might be disturbed either by sudden events or gradual changes that accumulate over time. (MS-ESS3-5)