

Alternative Science On a Sphere Activity for Remote Learning – Analyzing Global Patterns with GLOBE Earth System Poster Activities

Explore the GLOBE Earth System Posters (in either animation form or ‘poster cards’) using Earth Systems data for 2017 and 2018. The data visualizations can be used to help students find patterns among environmental data, understand the relationships among different environmental variables, and explore how the data change seasonally and over longer timescales. NASA and NOAA have provided detailed lessons that teachers can use. Teachers can submit students’ screenshots to the Institute for the Stewardship of the Natural World (ISNW) at JMU, and a staff member from the ISNW will display students’ work on Science On a Sphere (SOS) and send photos back to the teacher. Learn more at <https://myasadata.larc.nasa.gov/basic-page/analyzing-global-patterns-earth-system-poster-activities>. Instructional videos and a NSTA Lesson Review are also available at this website.

The GLOBE Posters

The GLOBE Digital Earth System Poster includes datasets for years 2017 and 2018 for solar (shortwave) radiation, surface temperature, cloud fraction, total rainfall, vegetation, and more (See Figure 1). Selecting a play button on the digital poster initiates a YouTube video shows changes over time during the selected year.

Figure 1: GLOBE Digital Earth System Poster

2018

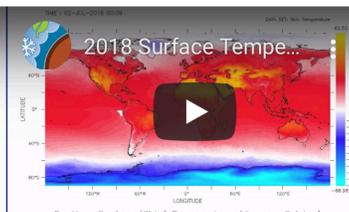
Solar (Shortwave) Radiation

Surface Temperature

Cloud Fraction



[Earth System Data Explorer | Get Data](#)



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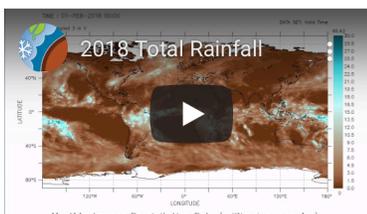


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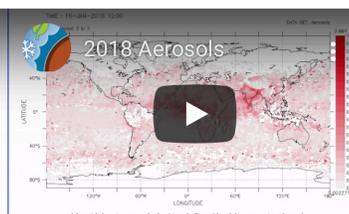
Total Rainfall

Aerosols

Vegetation



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For those who prefer to use a traditional poster cards rather than the digital option, archived posters are available at the same website for 2007, 2013, 2016, 2017 and 2018.

Educational Materials

The My NASA Data website offers educational materials to be used by teachers and students in conjunction with the posters. There are lessons ideas for specific grade levels:

- K-5: https://mydasdata.larc.nasa.gov/sites/default/files/2019-08/GLOBEPosterIntheClassroomK-5_v4_508.pdf
- 6-8: https://mydasdata.larc.nasa.gov/sites/default/files/2019-08/GLOBEPosterIntheClassroom6-8_edit_v4_508.pdf
- 9-12: https://mydasdata.larc.nasa.gov/sites/default/files/2019-08/GLOBEPosterIntheClassroom9-12_edits_v4_508.pdf

Further, the Earth System Poster Activity Guide website (<https://mydasdata.larc.nasa.gov/lesson-plans/globe-earth-system-poster-activity-guide>) offers a detailed activity guide (https://www.globe.gov/documents/10157/334459/Earth_System_Poster_07_Activities.pdf) for secondary level students (that can be adjusted for other grade levels) and instructional videos (<https://sites.google.com/alaska.edu/arcticandearthsigs/learning-activities/globe-earth-system-poster>). See Figure 2.

Figure 2: Earth System Poster Card Learning Activity Guide

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Earth as a System Learning Activities

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

Overview

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.

The latest version of the GLOBE Earth System Poster—Exploring Connections in Year 2007 and this accompanying activity guide will serve as a way to introduce the importance of Earth system connections to a new generation of students around the world.

Sincerely,
The GLOBE Program

Purpose:

To identify global patterns and connections in environmental data contained in the GLOBE Earth Systems Poster and to develop an understanding of the interactions within the Earth system.

Overview:

Images displaying global environmental data through the course of 2007 are compared in order to understand how the Earth works as a system. Extension activities connect the Earth System Poster to external web sites (e.g., NASA, NOAA, NSIDC, and SERC).

Student Outcomes:

Science Concepts

Earth and Space Science

- Students will be able to explore the concepts of Earth as a System.
- Students will be able to find patterns and connections between and among maps containing different environmental data.
- Students will understand the relationship between time and space in regard to global environmental data.

Scientific Inquiry Abilities:

- Discover, analyze, and interpret patterns in a graphic display of data.
- Conduct an analysis of mapped data.
- Develop descriptions and explanations using evidence.
- Communicate observations and explanations.

Level:

Secondary (Note: teachers of higher primary grades may also find some of these activities useful and applicable).

Time:

Two to three class periods for Activities 1 through 5 plus Assessments (Extension Activities will require additional time)

Materials & Tools:

- One "GLOBE Earth System Poster for year 2007." The poster, individual images (for individual downloading and printing) as well as the complete set of activities to accompany the Earth System poster can be found on the GLOBE Web site at www.globe.gov/page/earth_system.
- Internet connection is required for Extension Activities
- Scissors

Preparation:

Cut the GLOBE Earth System Poster into:

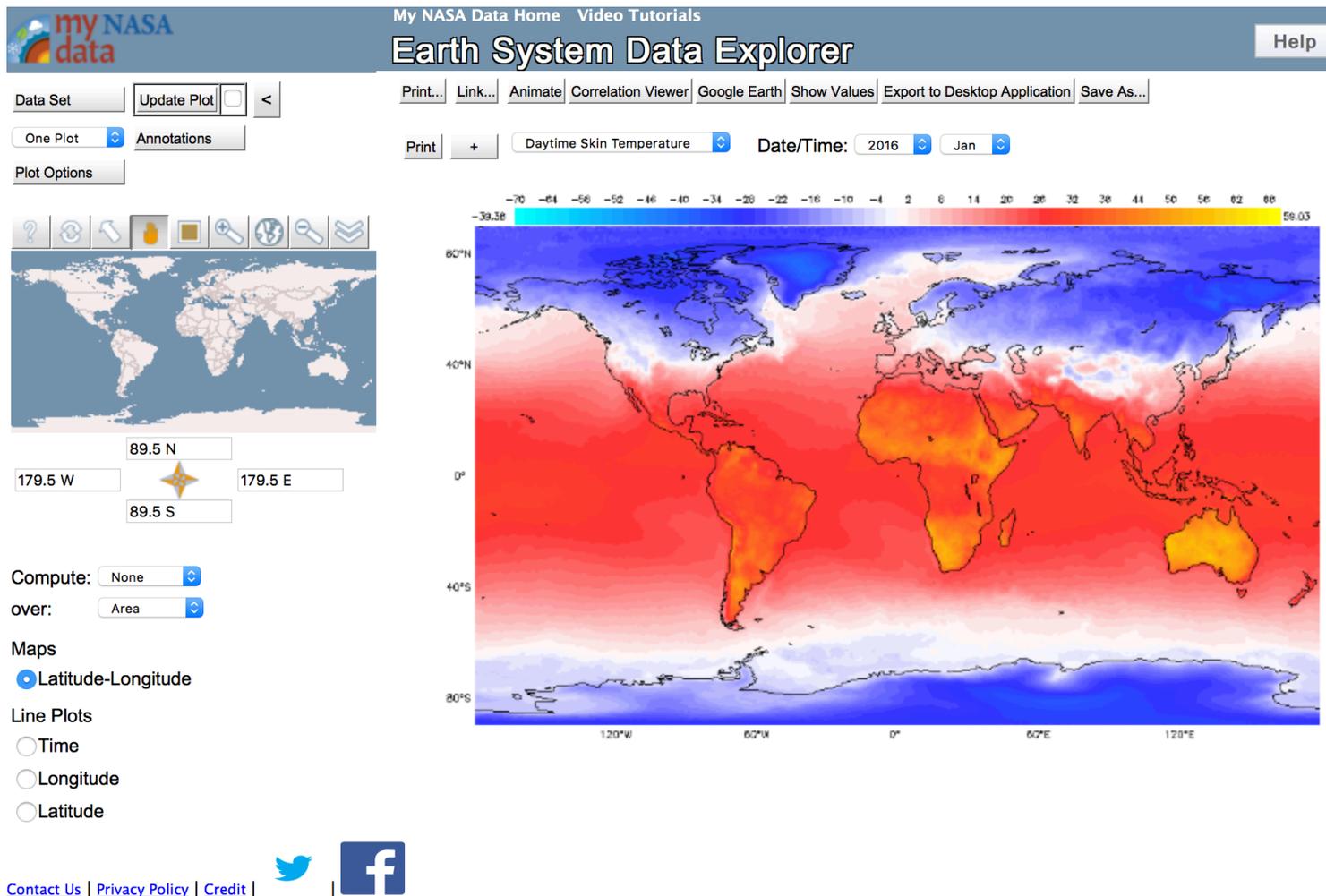
- The 36 global images: 6 – Insolation; 6 – Surface Temperature; 6 – Cloud Fraction; 6 – Precipitation; 6 – Aerosol Optical Thickness; 6 – Biosphere
- The 6 labels (Insolation, Surface Temperature, Cloud Fraction, Precipitation, Aerosol Optical Thickness, Biosphere)
- The 6 Month labels (January, March, May, July, September, November)

Or print out individual images from the GLOBE Web site (see url above). Lamination of images can ensure long-term use.

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For those who want to explore further, students and teachers can access NASA's Data Explorer (<https://mynasadata-las.larc.nasa.gov/EarthSystemLAS/UI.vm>), to create their own plots, animations, and images. See Figure 3. Go to the "Dataset" button in the upper left corner to select a dataset. The tab for video tutorials is at the top, right of the screen (not shown).

Figure 3: Screenshot from NASA's LAS



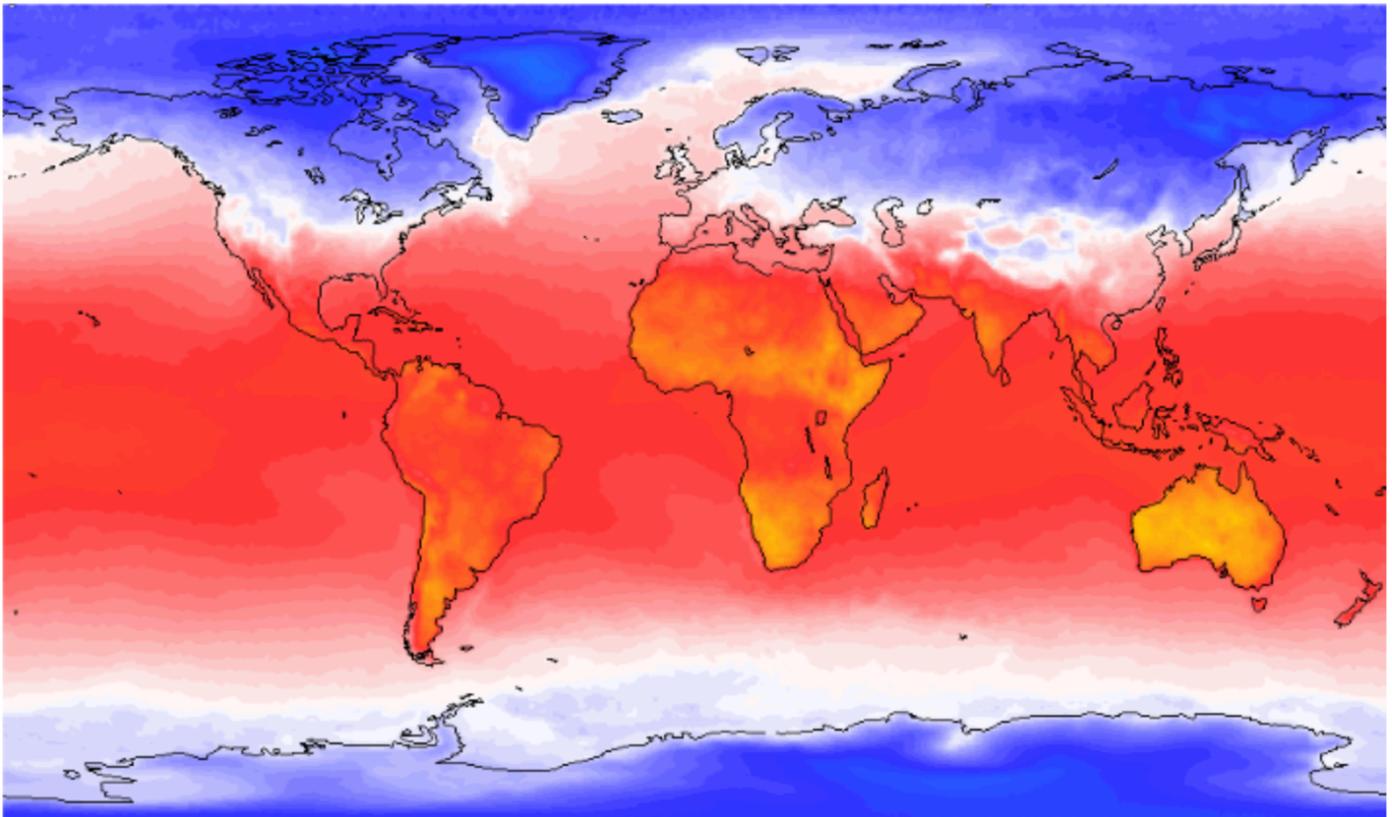
Use of Poster and LAS with SOS

Screenshots from the poster or Data Explorer can be sent to the ISNW for display on Science On a Sphere (SOS). A staff member from the ISNW will take a photo of the image on SOS and send it to the teacher to share with the class.

Instructions for saving images for use with SOS:

1. Students or teachers create a screenshot (such as the example shown in Figure 4), save it as a JPG or PNG file, and upload it to Dropbox. Teachers will need to email stewardship@jmu.edu in advance for instructions on how to upload the image to Dropbox and an anticipated delivery date.

Figure 4: Image of Surface Temperature - January 2016 from 2016 Poster



2. An ISNW staff member will upload the images to SOS.

3. The ISNW will send a photo of the image on SOS (see Figure 5) to the teacher to share with students.

Figure 5: Image of Surface Temperature - January 2016 from 2016 Poster, as seen on SOS

