My NASA Data - Lesson Plans

Global Phytoplankton Distribution Story Map

Overview

This story map is intended to be used with students who have access to a computing device in a 1:1 or 1:2 setting. Using various visualizations (i.e., images, charts, and graphs), students will explore global phytoplankton distribution using chlorophyll concentration data. Students will investigate the processes that allow phytoplankton populations to thrive, as well as how their role in the carbon cycle impacts the other spheres of the Earth System.
Virtual Teachers: Make a copy of the Google Form of your choice so that you may assign it directly from your Google Drive into your Learning Management System (e.g., Google Classroom, Canvas, Schoology, etc.). Do you need help incorporating these Google Forms into your Learning Management System? If so, read this Guide to Using Google Forms with My NASA Data.

Learning Objectives

- Students will analyze and compare multiple variables of the Earth System as they analyze the global distribution of phytoplankton.
- Students will observe annual patterns in chlorophyll concentration and shortwave radiation.
- Students will construct explanations and conclusions using evidence.

Why Does NASA Study This Phenomenon?

Phytoplankton account for roughly half of the net photosynthesis on Earth. Their photosynthesis consumes carbon dioxide and plays a key role in transferring carbon from the atmosphere to the ocean. Unlike the plant ecosystems on land, the amount of phytoplankton in the ocean is always followed closely by the abundance of other organisms that eat phytoplankton. By analyzing the NASA ocean color satellite data, scientists have provided new insights into how climate and ecosystem processes effect and are affected by the growth cycles of phytoplankton.

Essential Questions

1. What conditions within the Earth System allow phytoplankton to thrive?
2. How do changes in shortwave radiation affect the distribution of phytoplankton?
3. What affect do sea surface temperature and ocean currents have on distribution of phytoplankton?
4. How does chlorophyll concentration indicate the presence of phytoplankton?
5. How do phytoplankton contribute to the carbon cycle?

Cross-Curricular Connections

National Geography Standards:

- How to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective.

Materials Required

Resources Needed Per Student:

- Student Data Sheet - Link

Resources Needed Per Group:

- Computer/Tablet
- Internet Access
- Link to the "Global Phytoplankton Distribution" Story Map - Link

Technology Requirements

- Internet Required
- One-to-a-Group

Teacher Background Information

At the bottom of the ocean’s food chain, phytoplankton account for roughly half of the net photosynthesis on Earth. Their photosynthesis consumes carbon dioxide and plays a key role in transferring carbon from the atmosphere to the ocean. Unlike the plant ecosystems on land, the amount of phytoplankton in the ocean is always followed closely by the abundance of organisms that eat phytoplankton, creating a perpetual dance between predators and prey.

To learn more, visit:

- The MND Phytoplankton Distribution Phenomena page for background information
- The Explain tab found in the Story Map

Prerequisites Student Knowledge

- Familiarity with finding coordinates on a map
- Familiarity with line plots and bar graphs

Procedure
Visit the **Story Map** to access the 5 E Lesson.

**Global Phytoplankton Distribution**

**Purpose:**
This story map allows students to explore global phytoplankton distribution patterns using NASA chlorophyll concentration data. Students will investigate the processes that allow phytoplankton populations to thrive, as well as how their role in the carbon cycle impacts the other spheres of the Earth System.

**Grade Level:** 7-12

**Essential Questions:**
1. What conditions within the Earth System allow phytoplankton to thrive?
2. How do changes in shortwave radiation affect the distribution of phytoplankton?
3. What affect do sea surface temperature and ocean currents have on the distribution of phytoplankton?
4. How does chlorophyll concentration indicate the presence of phytoplankton?
5. How do phytoplankton contribute to the carbon cycle?

**Estimated Time for Completing Activity:** Two 50 minute class periods

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**Teacher Answer Key**

Teachers who are interested in receiving the answer key, please contact My NASA Data from your school email address at [larc-mynasadata@mail.nasa.gov](mailto:larc-mynasadata@mail.nasa.gov).

**Extensions**

If your students need additional practice with data analysis, consider incorporating this story map with the My NASA Data [Data Literacy Cubes](https://www.nasa.gov/education/data-literacy-cubes).