My NASA Data - Lesson Plans

Sea Ice and the Earth System Story Map

Summary: Students will explore changes in sea ice extent as it relates to other spheres within the Earth System. They will develop an interactive concept map that they will use to document their understanding of the Earth System as it relates to changes in sea ice. During the Evaluate stage, they will consider how an increase in our air temperatures may impact other parts of the system that have been explored in this story map.

Grade Level: 7-12

Essential Questions:
1. How do seasons influence changes in sea ice extent?
2. How does sea ice melt influence the Arctic ecosystem?
3. What affects changing air temperatures have on observed trends in sea ice extent?
4. How does sea ice melt change ocean circulation patterns?
5. What is albedo and how does it affect the cryosphere?

Estimated Time for Completing Activity: Two 50 minute class periods

Overview

Using various visualizations (i.e., images, charts, and graphs), students will explore changes in sea ice extent as it relates to other spheres within the Earth System. 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.
Learning Objectives

- Students will analyze maps and time series data to understand changes.
- Students will construct data-based explanations and conclusions.
- Students will compare multiple variables of the Earth System as they analyze global changes in the cryosphere.
- Students will consider the impact of environmental changes on wildlife.

Why Does NASA Study This Phenomenon?

Sea ice plays a fundamental role in polar ecosystems and global climate. The white surface of sea ice reflects far more sunlight back to space than ocean water does. As more ice melts and exposes more dark water, the water absorbs more sunlight and, in turn, melts more ice. Over several years, this feedback can influence the global climate. Additionally, sea ice melt can influence air temperatures and ocean salinity patterns. All of these changes affect the habitats of Arctic animals such as seals, foxes, polar bears, and whales.

NASA measures sea ice from space using both active and passive sensors operating at a variety of wavelengths. Active sensors, like radars and lasers, send a signal out and receive it back, whereas passive sensors passively receive radiation coming to the instrument from elsewhere. These sensors will help NASA measure sea ice changes and how they influence the other spheres of the Earth System.

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Cross-Curricular Connections

National Geography Standard

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

Materials Required

Per Student:

- Sea Ice and the Earth System Story Map Datasheet

Per Student/Small Group:

- Computer or Tablet
- Internet Access

Technology Requirements

- Internet Required
- One-to-One (tablet, laptop, or CPU)

Teacher Background Information

Sea ice is frozen seawater that floats on the ocean surface in both the Arctic and the Antarctic. This floating ice has a profound influence on the polar environment, influencing ocean circulation, weather, and regional climate. Sea ice is constantly changing with periods of growth and melting throughout the year. The amount of sea ice in the Arctic increases during the winter months, usually starting in September, and decreases during the summer months, usually starting in March.

Procedure

1. Using an internet accessible device, students open the link to the Sea Ice and the Earth System Story Map Lesson: https://nasa.maps.arcgis.com/apps/MapSeries/index.html?appid=2adb302f548945d08f9aed5e41352255
2. Distribute the Sea Ice and the Earth System Story Map Student Sheet. Have students navigate on their own through the Engage, Explore, Explain, Elaborate, and Evaluate tabs of the story map to answer the questions and complete the activities on their student sheet.
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.

Extensions

If your students need additional practice with data analysis, consider incorporating this story map with the My NASA Data Data Literacy Cubes.