My NASA Data - Lesson Plans

When Floating Ice Melts

Grade Band

- 3-5
- 6-8

Time

• 30 minutes

Overview

This activity invites students to simulate and observe the different effects on sea level from melting sea-ice.

Credit: Modified from POLAR-PALOOZA (National Science Foundation under Grant No. 0632262) and the Office of Science, Department of Energy.

Materials Required

Materials: (for each team of 4 students)

- container
- pitcher of water
- several trays of ice cubes

Procedure

Engage

- 1. As global temperature increases heat up the upper layers of the ocean, they will cause some of the large amounts of floating ice in the Antarctic and Arctic Oceans to melt.
- 2. Present the following question to students: Will the melting sea ice add more water to the oceans and cause sea levels to rise? Ask students to write down or verbally respond. (The answer is no.)

- 3. Distribute Student Data Sheet to each student.
- 4. Review the Claim section and have students develop one statement that addresses their prediction about the relationship between sea level and melting sea ice.

Student Data Sheet

Student Name:	Date: Pe	eriod:
Claim: (One sentence statement that addresses the relationship between sea level and melting sea ice.)		
Evidence: Sufficient, Appropriate, and Observation-driven	(Why is t	Reasoning his evidence important?)
Qualitative Observations:	Qualitative Observat	tions:
1.	1.	
2.	2.	
3.	3.	
Quantitative Observations: 1. 2. 3.	Quantitative Observents 1. 2. 3.	ations:

Explore

- 1. Distribute model materials to student teams of up to 4 students each.
- 2. Step students through the Evidence section of the CER Model on the Student Data Sheet. Direct students to collect qualitative and quantitative data as they conduct the investigation.
- 3. Next, review materials and procedure for developing the model.

Procedure:

- Place the ice cubes in the container
- Fill the container with the water until full.
- Observe the water level as the ice melts.
- Document findings using qualitative and quantitative descriptions in the Evidence section of the Student Data Sheet

Explain

1. Present the video here and connect the concept of reflectivity and the role that the color of Earth's surface plays on our climate. As students learn about the characteristics and dynamics of sea ice, they should collect their ideas under the Reasoning section of the Student Data Sheet. They should connect the scientific ideas to any observations they make in the Evidence column.

Video: NASA Arctic Sea Ice 101
Arctic Sea Ice 101 https://www.youtube.com/watch?v=_m-M37vc-m0 Source: NASA Goddard
2. Show students this animation and elicit students' ideas. The video shows how this ice survives from year to year. In the animation, age of the sea ice is visible, showing the younger ice in darker shades of blue and the oldest ice in brighter white. This visual representation of the ice age clearly shows how the quantity of older and thicker ice has changed between 1984 and 2016.
Video: 2018 Arctic Sea Ice Ties for Sixth Lowest Minimum Extent on
NASA Record
2018 Arctic Sea Ice Ties for Sixth Lowest Minimum Extent on NASA Record
https://www.youtube.com/watch?v=pyldwDbtcGs Source: NASA Goddard

Evaluate

- Have students share their CER models with the class. See <u>rubric</u> in Teacher Sheet for assessment.
- 2. Review answers to the following questions:
- Would melting ice cause sea level to rise?
- What are the reasons for the answer?
- Have students discuss the differences, if any, between what they predicted and what they
 observed.

NGSS Three Dimensional Learning

NGSS Disciplinary Core Ideas

- ESS2A: Earth Materials and Systems
- ESS3B: Natural Hazards
- ESS3C: Human Impacts on Earth Systems

NGSS Crosscutting Concepts

Cause and Effect

NGSS Science and Engineering Practices

Developing and Using Models

Learning Objectives

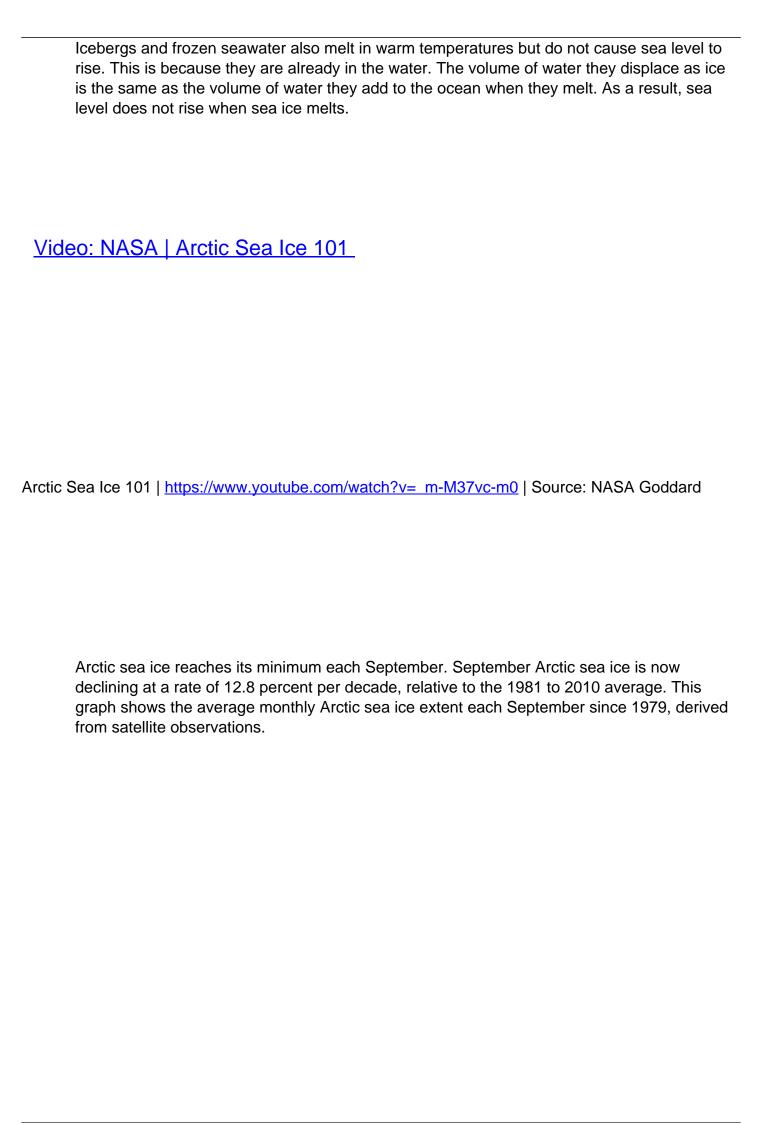
- Students will investigate whether melting sea-ice affects sea level
- Students will apply the Claims-Evidence-Reasoning learning strategy to support their conclusions

Essential Questions

• How is sea ice related to sea level change?

Teacher Background Information

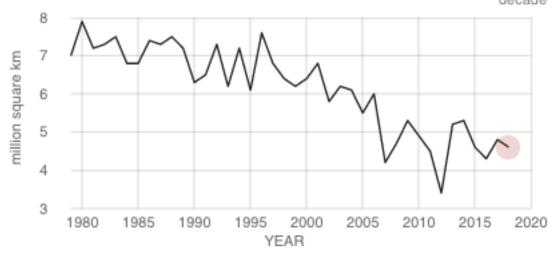
Sea level is rising, in part, because melting glaciers on land are adding more water to Earth's oceans. Glaciers – large sheets of ice and snow – exist on land all year long. They are found in the mountains of every continent except Australia. Greenland and Antarctica contain giant ice sheets that are also considered glaciers. As temperatures rise, glaciers melt faster than they accumulate new snow. As these ice sheets and glaciers melt, the water eventually runs into the ocean, causing sea level to rise.



AVERAGE SEPTEMBER EXTENT

RATE OF CHANGE

Data source: Satellite observations. Credit: NSIDC/NASA 12.8 percent per decade





Get Data: HTTPS | Snapshot: PNG

AVERAGE

SEPTEMBER EXTENT

Data source: Satellite observations.

Credit: NSIDC/NASAhttps://climate.nasa.gov/vital-signs/arctic-sea-ice/

The animated time series below shows the annual Arctic sea ice minimum since 1979, based on satellite observations. The 2012 sea ice extent is the lowest in the satellite record.

<u>Video: 2018 Arctic Sea Ice Ties for Sixth Lowest Minimum Extent on NASA Record</u>

2018 Arctic Sea Ice Ties for Sixth Lowest Minimum Extent on NASA Record | https://www.youtube.com/watch?v=pyldwDbtcGs | Source: NASA Goddard

Student Resources

• Student Sheet

Teacher Resources

• CER Rubric