



Melt Down

How does melting land-based ice (ice sheets) change the sea level? What about melting sea ice (floating ice shelves and icebergs)?

Key Concept

Melt water from **land-based ice** (ice sheets in Greenland and Antarctica) eventually enters the ocean and raises sea level, whereas melting of **sea ice** (icebergs or Arctic ice floating on the ocean) does not raise sea level because it is already displacing a volume of water equal to itself.

What You Should Know

- Roughly 10% of Earth's land surface is covered by ice.
- Currently most of the ice on Earth is stored in ice sheets covering Greenland and Antarctica.
- The air in Antarctica has warmed by 5.4° F (3° C) in the last 50 years.

Materials (per student or group of students)

- Two clear cups
- Material to suspend ice cubes over cup of water such as cheesecloth or perforated plastic wrap
- Ice cubes (3-6 small pieces)
- Hair dryer or other warming device to melt the ice (optional)

The Prediction

When ice floating in water melts, will that change the water level? When ice on land melts, will that change the water level?

Investigation

- 1) Fill two cups with water to half full.
- 2) Add two to three ice cubes to cup #1 and mark the water level on the outside of the cup.
- 3) Mark the water level on the outside of cup #2.

- 4) Cover cup #2 with cheesecloth or perforated plastic wrap and place two to three ice cubes on top making sure that the meltwater from the ice cubes drips into the cup.
- 5) Let the ice melt in both cups (optional: use a hair dryer or warming lamp to expedite.)
- 6) Observe the water level change in both cups after the ice has completely melted.

Discussion

- 1) How did the melting ice affect the water level in both cups?
- 2) What is the main cause of global sea levels rising?
- 3) Where is most of the land ice located on Earth? What about sea ice?
- 4) What environmental factors could be causing the melting of sea ice? What about land ice?
- 5) What are some of the environmental consequences of rising sea levels?

What's Happening?

When ice floating in water melts, the water level stays the same because the volume of the melted water fits exactly in the volume previously displaced by the floating ice. In contrast, the water level increases when the ice that sits above it melts because it adds volume to the water. The melting of land-based ice (e.g., glaciers in Antarctica) will contribute to global sea-level rise, whereas the melting of sea ice and icebergs, though significant in other ways, will result in little if any measurable change in sea level. Rising sea levels increase flooding, damage low-lying ecosystems, and accelerates coastal erosion.