

# Warm seas, big waves destroying Arctic ice faster than expected

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A ship makes its way through Arctic ice. Photo: Pixabay / tpsdave

Ice covers much of the Arctic Ocean, the chilly waters near the North Pole. As the global temperature has increased, however, some of the ice has begun to melt. With less ice floating in the water, scientists have discovered that huge waves are rolling through the arctic waters.

The waves were discovered by accident. In May 2010, researcher Aleksey Marchenko and a group of students set out on the Barents Sea, just south of the Arctic Ocean. Marchenko made this trip every year.

## Cracks In The Ice

Near the edges, the ice is composed of pieces loosely drifting on the water. Farther inside, however, there are huge chunks that form a nearly solid mass. Marchenko's ship can usually pick its way slowly through it. In previous years, the chunks of ice were solid enough to camp on.

This trip turned out to be different. On May 2, the ship sailed east and moored next to a large chunk of ice around 50 miles from the small island of Hopen. Marchenko prepared to lead his class out onto the ice.

“We were ready to go but when I went out, I discovered many cracks around,” he remembers.

He decided to move the ship deeper into the ice for safety. The farther in he went, he thought, the more stable the ice would become. As they pushed forward, however, the ship encountered small waves, and then bigger ones. Soon, the waves broke up the ice around the ship into thousands of smaller pieces.

### **Looking Up At Tall Waves**

Within an hour, Marchenko and his team witnessed a wave that was about 13 feet high. The boat's navigation system ultimately recorded waves more than 20 feet in height, the largest ever measured in icy waters. “And we could see even bigger waves higher than the deck of the ship — 30 feet or more,” Marchenko says.

Marchenko later gave his measurements to Clarence Collins and his coworkers at the U.S. Naval Research Laboratory (NRL) in Mississippi. Collins analyzed the measurements to try to figure out how such big waves made it so far into the ice.

He found that the ice near the outer edge of the pack absorbed some of the energy of arriving waves. At the same time, the outer layer of ice focused the remaining energy into pulses that could lift the ice pack as the waves rolled beneath. The rise and fall strained ice to the breaking point. Once broken, the smaller ice chunks allowed the largest waves to pass through and attack solid ice farther in.

### **Waves Destroy Ice Quickly**

The ice went from blocking almost all the wave energy to none at all within just one hour. The process happened so fast, in fact, that Collins calculated waves were destroying the ice at a rate of over 10 miles of ice an hour.

Scientists had never imagined that Arctic waves could break up ice so quickly. Historically, the waves in these regions were small. So much of the oceans was covered with ice that there was little open space where storms could whip up big waves.

Climate change has brought milder winters, warmer sea temperatures and bigger storms. This is a dangerous combination. Warmer temperatures lead to less ice and more open seas. This lets waves then build up energy in open water and then crash into the arctic ice, breaking it up and clearing even more open water.

### **Could Spell Disaster**

The presence of large, powerful waves in these areas makes navigating them more dangerous. The speed and ferocity of the waves makes it impossible to know in advance when they are coming. That could spell disaster for sailors, oil companies and native communities who are unprepared for large waves or rely on sea ice to protect them. Wildlife like polar bears and walrus that rely on abundant sea ice to survive are also in danger.

Collins does not expect the record waves that Marchenko observed in 2010 to remain a record for long. As waves break up ice, the Arctic seas will become more open, and as a result, waves will become even stronger. For the Arctic Ocean, there are stormy times ahead.

## Quiz

- 1 Which of the following sentences BEST captures the central idea of the article?
  - (A) A group of students and scientists were surprised to observe large waves in the Arctic, proving that Arctic ice is melting very slowly.
  - (B) Arctic waves are now so enormous that they are shattering world records, leading more scientists to begin studying them.
  - (C) While visiting the Arctic, a scientist and his students recorded the size of waves and sent the information to a laboratory for further research and analysis.
  - (D) Scientists have discovered that due to global warming, increasingly large waves are breaking up Arctic ice and causing danger for animals and humans.
  
- 2 Which paragraph from the section "Cracks In The Ice" BEST explains why Marchenko was surprised that the ice broke?
  
- 3 Which answer choice best explains the significance of Marchenko's findings?
  - (A) Due to the effects of waves on sailors and polar bears, climate change is now being taken seriously.
  - (B) Melting ice and increased danger for humans and animals may lead to new records in Arctic wave size.
  - (C) Because of larger waves and melting ice, humans and animals are increasingly at risk.
  - (D) Smaller ice pieces and larger waves mean that it is no longer safe for scientists to study the Arctic area.
  
- 4 Based on the article, which information MOST influenced Clarence Collins and the U.S. Naval Research Laboratory?
  - (A) The process happened so fast, in fact, that Collins calculated waves were destroying the ice at a rate of over 10 miles of ice an hour.
  - (B) Collins analyzed the measurements to try to figure out how such big waves made it so far into the ice.
  - (C) . "And we could see even bigger waves higher than the deck of the ship — 30 feet or more," Marchenko says.
  - (D) As waves break up ice, the Arctic seas will become more open, and as a result, waves will become even stronger.