

A Swiftly Melting Planet

Sea ice is a critical part of the Arctic ecosystem – and it plays a role in the global climate system. Global climate models project that Arctic summers will eventually become practically ice-free, but they disagree on when that will happen. In a new study published in *Nature Climate Change*, UCLA Center for Climate Science researchers have developed a novel way to evaluate how well different models depict sea ice processes – and to identify which models offer more realistic projections.

What is happening to Arctic sea ice?

The Arctic is already losing ice because of human-caused climate change. This image compares sea ice extent in 2019 (for the month of September, when Arctic sea ice is at its minimum) with the corresponding average between 1981 and 2010.



□ Current minimum ice coverage
 ■ Historical minimum coverage

↑ **2x**

The Arctic is warming twice as rapidly, compared with the rest of the planet.

↓ **13%**

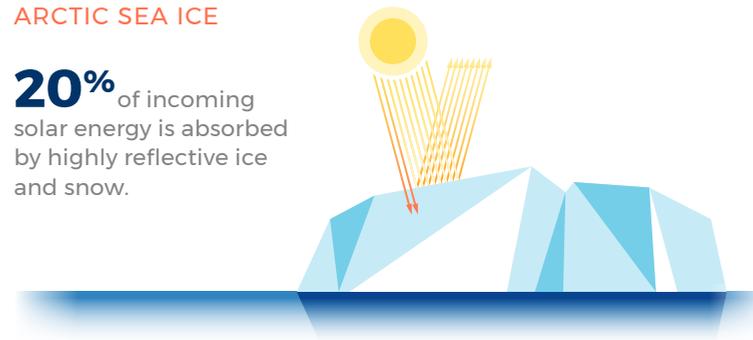
of Arctic sea ice has been lost each decade since 1979, satellite records show.

Why is the Arctic changing so fast?

A major factor in rapid Arctic warming is a phenomenon called **sea ice albedo feedback**, which makes warming more severe where ice melt occurs. A surface's "albedo" is how reflective it is of sunlight.

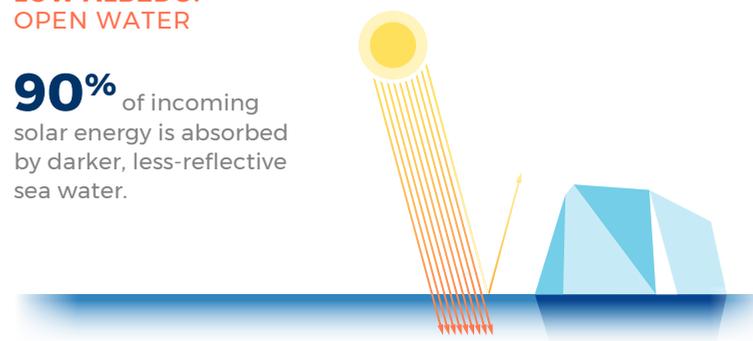
HIGH ALBEDO:
ARCTIC SEA ICE

20% of incoming solar energy is absorbed by highly reflective ice and snow.



LOW ALBEDO:
OPEN WATER

90% of incoming solar energy is absorbed by darker, less-reflective sea water.



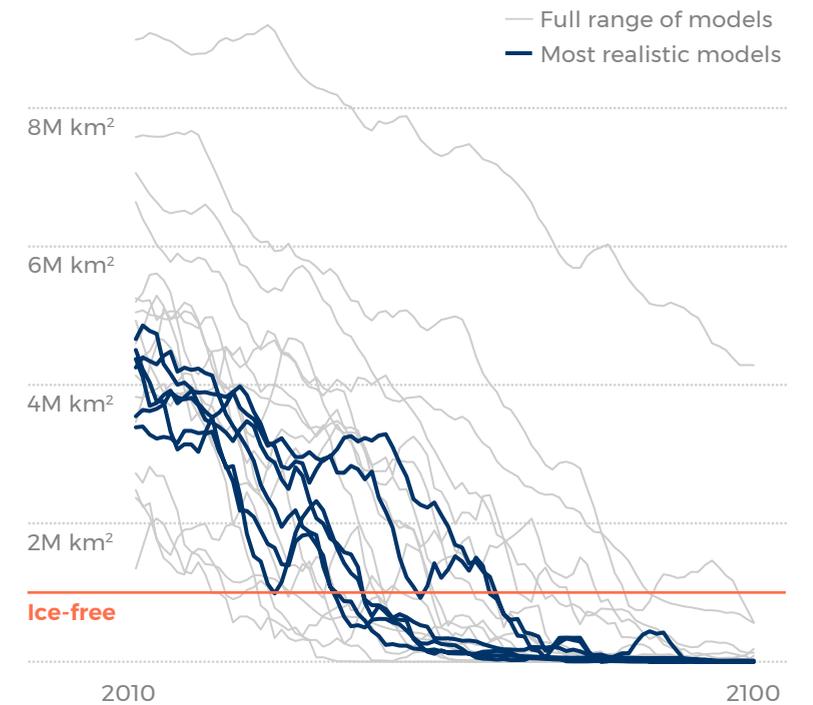
THE FEEDBACK LOOP

When sea ice melts, it uncovers open sea water, which absorbs more sunlight than ice would have. Greater local warming occurs, which in turn leads to further ice loss. This cycle continues.

How soon might seas be "ice-free"?

Global climate models disagree on when Arctic ice will disappear. If we continue on our current greenhouse gas emissions path, models project that Septembers will become functionally ice-free (using scientists' standard definition of sea ice extent under 1 million square kilometers) between 2026 and 2132. Our study set out to narrow this range.

10M km² Sea Ice



2044–2067

is the range for functional September sea ice disappearance when we include only those global climate models shown to be most realistic in their portrayal of sea ice albedo feedback and ice loss.