Scientists find another threat to Greenland's glaciers lurking beneath the ice

By Gisela Crespo, CNN

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The 79° North Glacier's ice tongue is in northeast Greenland.

(CNN) Scientists have long known that higher air temperatures are contributing to the surface melting on Greenland's ice sheet.

But a new study has found another threat that has begun attacking the ice from below: Warm ocean water moving underneath the vast glaciers is causing them to melt even more quickly.

The findings were published Monday in the journal Nature Geoscience by researchers who studied one of the many "ice tongues" of the Nioghalvfjerdsfjorden Glacier -- also known as the 79° North Glacier -- in northeast Greenland.

Another view of the 50-mile-long glacier tongue shows torrential meltwater streams making their way toward the ocean.

An ice tongue is a strip of ice that floats on the water without breaking off from the ice on land. The massive one these scientists studied is nearly 50 miles long.

The survey revealed an underwater current more than a mile wide where warm water from the Atlantic Ocean is able to flow directly towards the glacier, bringing large amounts of heat into contact with the ice and accelerating the glacier's melting.

These measuring instruments study ocean temperatures and are strung together on rope and fixed to the ocean floor.

"The reason for the intensified melting is now clear," said Janin Schaffer, an oceanographer from the Alfred Wegener Institute in Germany who led the team of researchers, in a release about the findings.

The scientists also found a similar current flowing near another of Greenland's glaciers, where a large ice tongue had recently broken off into the ocean.

What warmer oceans mean for the planet

Mass loss from Greenland's ice sheet is currently the single largest driver of sea level rise globally, and according to a study published in December in the journal Nature, Greenland's ice sheet is currently melting seven times faster than it was in 1992.

This ice sheet holds enough water to raise global sea levels by more than 24 feet.

Much of the Arctic experienced record temperatures last summer, which caused Greenland's ice sheet to lose 11 billion tons of surface ice to the ocean in just one day, scientists said. That is the equivalent of 4.4 million Olympic swimming pools.

In July alone, Greenland's ice sheet lost 197 billion tons of ice, or the equivalent of around 80 million Olympic swimming pools, according to Ruth Mottram, a climate scientist with the Danish Meteorological Institute.

Water temperatures also broke records in 2019. A study published in the journal Advances in Atmospheric Sciences says the ocean temperature last year was 0.075 degrees Celsius above the 1981-2010 average. The study's authors said the heat absorbed today by the world's oceans is now equivalent to dropping roughly five Hiroshima bombs into them every second over the past 25 years.

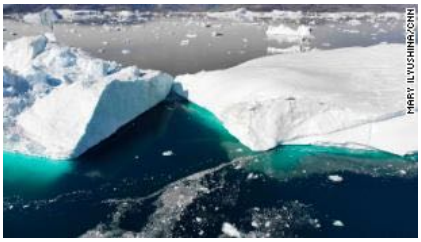
Warmer oceans as a result of the climate crisis also make extreme weather events such as hurricanes capable of producing more rainfall.

And ocean heat impacts the stability of sea life, which could lead to declining fish catches in many parts of the world dependent on the ocean as a primary food source.

CNN's Drew Kann, Mark Tutton and Ivana Kottasová contributed to this report.

At the bottom of a glacier in Greenland, climate scientists find troubling signs

By Mary Ilyushina and Frederik Pleitgen, CNN



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Kulusuk, Greenland (CNN) On one of the hottest days this summer, locals in the tiny village of Kulusuk, Greenland, heard what sounded like

an explosion. It turned out to be a soccer field's worth of ice breaking off a glacier more than five miles away.

Greenland lost 12.5 billion tons of ice to melting on August 2, the largest single-day loss in recorded history and another stark reminder of the climate crisis.
Kulusuk is also base camp for NASA's OMG (Oceans Melting Greenland) program. OMG scientists traveled to the world's biggest island this year after a heatwave scorched the United States and Europe, smashing temperature records and triggering the mass melting of its ice sheet.

NASA oceanographer Josh Willis and his team are investigating how the ice is being attacked not only by rising air temperatures but also by the warming ocean, which is eating it away from underneath.

A remodeled World War II DC-3 plane, now called Basler BT-57, takes a group of OMG researchers around the coast of Greenland. From the air the crew launch special probes through the ice floor, which then transmit data on temperature and salinity, which is used to plot possible sea level rises and what they would mean for humanity in the future.
"There is enough ice in Greenland to raise the sea levels by 7.5 meters, that's about 25 feet, an enormous volume of ice, and that would be devastating to coastlines all around the planet," said Willis. "We should be retreating already from the coastline if we are looking at many meters [lost] in the next century or two."
NASA took CNN on a dramatic flight over Helheim -- one of the largest glaciers on Greenland and the fastest flowing on the eastern edge of the island. Helheim, named after the realm of the dead in Norse mythology, is majestic, standing at more than four miles wide and roughly the height of the Statue of Liberty.

As our plane approached Helheim, the scientists spotted an ice-free "lake" at the very front of the glacier, something they said they don't see often. The probes also brought back troubling data -- Helheim was surrounded by warm water along its entire depth, more than 2,000 feet below the surface.
"It's very rare anywhere on the planet to see 700 meters of no temperature variation, normally we find colder waters in the upper hundred meters or so, but right in front of the glacier it's warm all the way up," said Ian Fenty, climate scientist at NASA. "These warm waters now are able to be in direct contact with the ice over its entire face, supercharging the melting."

Ice-free "lake" at the front of Helheim glacier seen from a DC-3 plane.

Helheim has become famous in recent years as it has been retreating at a stunning rate. In 2017, the glacier lost a whopping two miles, and a year later scientists from New York University captured a miles-long ice column break off the glacier's front. The melt doesn't seem to be slowing this year either.
"It retreats by many meters per day, it's tens of meters per day. You can probably set your iPhone on timelapse and actually see it go by," Willis says as the data flashes up on his phone screen.

Glaciers like Helheim, and even the much smaller ones around villages like Kulusuk, are powerful enough to make the global sea level rise by half a millimeter in just a month -- something NASA researchers say cannot be ignored.
"Greenland has impacts all around the planet. A billion tons of ice lost here raises sea levels in Australia, in Southeast Asia, in the United States, in Europe," Willis said. "We are all connected by the same ocean."

Even though most still think of rovers and other planets when they think of NASA missions, in the 50 years since the moon landing, the public perception of what the agency should pour its resources into seems to be shifting. According to a recent study from the Pew Research Center, a majority of Americans now think that NASA's top priority should be monitoring key parts of Earth's climate system rather than sending a man to Mars.

And the OMG is just one of the projects looking at our home planet that NASA has been bulking up in the past few decades. As the budget of NASA's Earth Science Division increases, the agency is lining up at least two new satellites and exploration programs to track natural hazards.