Melting glaciers threaten catastrophic consequences for humanity

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18 October 2020

Global warming has already resulted in continual and worldwide loss of glacial ice. The concurrent melting of the permafrost ground layer is a possible tipping point—crossing a threshold beyond which no countermeasures can reverse global warming.

Last Monday the research vessel Polarstern made berth in Bremerhaven, having completed a year-long Arctic expedition. The expedition left Tromsø, Norway on September 20, 2019, on what they called the largest Arctic expedition of all time. Under the direction of the Alfred Wegener Institute (AWI), rotating crews of hundreds of scientists from 80 institutions and 20 countries were on board.

The Polarstern spent nearly 10 months docked on ice floes in the Arctic Ocean, allowing scientists to measure and document the entire ice cycle, from the winter freeze to the summer melt. The over €140 million mission was tasked with a year-long, all-encompassing measurement of Arctic ice and water. Scientists measured over 200 parameters, from temperatures in currents in deep water and at heights of up to 35 kilometers, to the microorganisms in and on the ice.

It will take years to completely evaluate the data, which will likely be used for decades. But this much is already clear: the researchers encountered weak, fractured and melting ice extending all the way to the north pole. They repeatedly came across melt-water ponds and open water.

"This used to be an area of old ice," says Polarstern captain Thomas Wunderlich. Now, however, in just a few days the Polarstern was able to advance practically unhindered to the North Pole. Since the 1980s, Arctic ice coverage has decreased by roughly half. The remaining ice is thin and thawing. The expedition has documented a collapsing world.

This year the Bering Strait was almost free of ice, as shown by a March 7 image from the European Earth-observing satellite Sentinel 1. Normally the strait is frozen that early in the year. According to the European Space Agency (ESA), there is currently less ice in the Bering Sea than at any point since records began in 1850.

By 2050, the temperature is expected to rise by at least 3°C (5.4°F); by 2080, by up to 9°C (16.2°F).

The Intergovernmental Panel on Climate Change (IPCC) is currently predicting that in the worst case, sea levels could rise by up to one meter by 2100 if global CO2 emissions are not successfully reduced. Researchers at the Potsdam Institute for Climate Impact Research (PIK) likewise anticipate that if greenhouse gas emission continues unabated, then by 2100 ocean level rise could surpass a meter. By 2300, oceans could have risen by as much as five meters.

If global warming is kept below 2°C in accordance with the Paris Agreement on climate change, oceans would rise by a half meter by 2100. Such far-reaching predictions are generally very difficult to make due to the small number of studies and lack of transparency. However, it is becoming increasingly clear how ocean currents, ice masses and water circulation react to global temperature rise.

The melting of the Greenland glaciers is particularly devastating, since it is now irreversible, even if warming were to stop immediately, report researchers led by Michalea King of Ohio State University. More glacial ice is lost than is replenished by precipitation from the interior, resulting in an open-ended decrease in the quantity of ice. The ice and snow were still in equilibrium until the year 2000, after which the system tipped. Since then the glaciers have lost 500 billion tons of ice per year, 50 billion tons more than before.

In July 2020, the ice was less expansive than in any July since the beginning of satellite measurements in 1979. Ice lost on Greenland contributes to global sea level rise and could cause problems for other regions of the world. In just two months of last year, ocean levels rose by 2.2mm.

Melting of the Greenland ice sheet had occurred primarily in the south and at lower elevations, but that had changed by summer 2012. Angelika Humbert, professor of glaciology in Bremen, Germany, explains: "It was an extreme year of melting in Greenland. You could measure with satellites that on the entire ice sheet, up into the high altitudes, there was

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melting on the surface."

At the end of August of this year, Ingo Sasgen of the Alfred Wegener Institute in Bremerhaven, Germany, published analyses of Grace-Fo satellite data that likewise show a greater loss in ice mass in 2019 than in any year since the beginning of measurements. Sasgen said: "We could show that the five greatest yearly losses have occurred in the last ten years."

The melt water from Greenland not only contributes to ocean rise, it also has the potential to disturb the North Atlantic current, the Gulf Stream. As such, it would directly impact Europe, from weather to fish stocks. There would likewise be consequences for the Arctic around Greenland—perhaps the most sensitive region for global warming—if new summer conditions became typical over the gigantic island.

Temperatures there have risen more than twice the global average. If all of Greenland's ice were to melt, global average sea levels would be seven meters higher than at present. However, the melting process would take thousands of years.

In 2019, the Intergovernmental Panel on Climate Change warned: "The non-linear reaction of ice melt to changes in ocean temperature mean that small increases have the potential for rapid melts and could destabilize large parts of an ice sheet or ice shelf."

This grave modification of nature would have extreme and far-reaching consequences. New land would be laid bare by retreating ice, but much more land area, including countless islands, would disappear under water. Land freed from glaciers would be unusable into the far future. The loss of land would drive so many people to flee as to make the current refugee crises pale in comparison.

Moreover, landmasses currently depressed by the mass of the glaciers would rebound. A landscape resulting from such a rise in the land is the archipelago landscape of Sweden, whose islands have risen out of the water. In Greenland, the rising land would take on far hillier dimensions.

Glacial melt is likewise being recorded in the Alps. The heat of the last decade and the warm winters have significantly shortened the snow season in the middle and high mountain ranges. In just the years from 2010 to 2014, the glaciers of the alps lost roughly a sixth (17 percent) of their volume, more than 22 cubic kilometers.

The Swiss Alps are particularly affected, as explained by researchers of the University of Erlangen-Nürnberg. Christian Sommer of the Institute for Geography says melting in the Alps has consequences far beyond the alpine region because of its influence on the flow in major European river systems that originate in the Alps.

Swiss researchers have predicted that the Alps could be completely free of ice by the end of the century. Half of the glaciers in the Alps could melt by 2050—and that independent of any success in reducing greenhouse gas emissions. The developments of the next decades cannot be stopped because glacial melt reacts very slowly to changes in climate, they explain.

In light of these alarming prognoses, it is necessary to take immediate and comprehensive measures, to implement existing concepts and to do everything possible to counter these processes and take protective action. But nothing of the sort is being seriously undertaken, rather quite the opposite.

An Oxfam study released September 21 shows that the richest 1 percent of humanity emits more than twice as much CO2 into the atmosphere as the entire poorer half. The report focuses on the years 1990 to 2015, during which the richest 10 percent (630 million) were responsible for more than half (52 percent) of CO2 emissions. The richest 1 percent (63 million) alone produced 15 percent, while the poorer half of the world's population was responsible for only 7 percent.

A solution to environmental problems is not possible within the framework of capitalism. Appeals to national governments, (for example through Fridays for the Future) or the occasional charitable endowment of this or that wealthy individual, will not stop global warming and the catastrophic exploitation and destruction of nature. What is necessary is a restructuring of the global economy—a new organization of worldwide energy generation and transport infrastructure as well as the development of new technologies for immediate containment of carbon emissions.

The basis of energy production must be converted from fossil fuels to renewable energies. This requires an international effort and massive financial investment in infrastructure, the development of existing technologies and the investigation of new ideas, instead of wasting trillions on war and the self-enrichment of the billionaires.

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