

# Multiple studies demonstrate global warming is melting glaciers faster

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Several recently published scientific studies clearly demonstrate that the melting of glaciers across the globe is accelerating due to human-induced climate change. A world-wide survey by a team based at the University of Zurich, published in the journal *Nature* (18 April 2019), reports that on average glacial melting is occurring at a rate 18 percent faster than was estimated only six years ago, and five times faster than in the 1960s. Collectively, this currently represents a loss of 369 billion tons of snow and ice per year.

The study was far more comprehensive than any previously conducted, examining ground and satellite data from 19,000 glaciers. It does not include the massive Greenland and Antarctic ice sheets.

The rate of loss varies by region, with the fastest melting taking place in central Europe, the Caucasus region, western Canada, the lower 48 states of the United States, New Zealand and near the tropics, where the rate is more than 1 percent per year. Of the 19 regions studied, only one—southwestern Asia—showed no significant glacial shrinkage.

Despite this variation, the near planet-wide distribution of this process demonstrates that a global phenomenon, climate change, is to blame, rather than localized factors.

The massive quantities of resulting meltwater from glaciers are a significant contributor to global sea level rise, representing approximately 25 to 30 percent of the annual total. Combined with the increase in volume of the oceans due to higher temperatures (water expands as it warms) and the concurrent melting of the Greenland and Antarctic ice sheets, the substantial input of water from melting glaciers pose a severe threat to billions of people living in coastal areas due to inundation and storm surge.

In addition, as glaciers retreat, the many regions of

the world where large populations rely on water from glacially-fed rivers (e.g., the Ganges), the quantities are likely to become less reliable. In the Himalayan region alone, 1.6 million people depend on glacial meltwater.

Corroborating the global review, a specific regional study led by Columbia University graduate student Joshua Maurer, used declassified spy-satellite images to examine the melting of Himalayan glaciers. It found that the rate of melting of the 650 largest glaciers across India, China, Nepal, and Bhutan, representing 55 percent of the region's ice volume, has doubled over the last two decades compared to that during the last quarter of the 20th century. Using temperature data from ground stations, he found melting to be greatest at the warmest locations, and less correlated with other factors. The study concluded that global warming was the main driver of accelerating melting of glaciers in the Himalayas.

Another recently published study predicted that even if global temperature rise was kept to 1.5 degrees Celsius, the Himalayas would lose one third of their glacial ice, but if current trends continue the loss could double. In either case, there will be dire consequences for downstream populations regarding agriculture, ecology, and hydropower.

The growing effects of global warming are also being seen in the Arctic. The Lamont-Doherty Earth Observatory at Columbia University reports that the spring thaw on Greenland's ice sheet as well as sea ice loss are occurring several weeks earlier than normal. The melting is the most extensive that has been observed since satellite measurements began in 1979. Air temperatures as much as 40 degrees Fahrenheit (4.4 Celsius) above normal have been recorded.

In mid-May, the atmospheric temperature in northwest Russia, near the entrance to the Arctic

Ocean, rose to 84 degrees Fahrenheit (29 Celsius). The average high temperature in that area at this time of year is 54 F. Similarly unusual high temperatures were recorded at other northern locations in Russia, Kazakhstan, and Finland. Several Alaskan rivers experienced the earliest ice breakup on record.

Overall, the warming of the atmosphere in the Arctic is occurring twice as fast as the global average. Recent studies demonstrate that the Greenland ice sheet is melting at a rate much greater than previously thought. Were it to melt entirely, the resulting water release from Greenland alone would raise sea levels by about 20 feet, inundating extensive coastal areas, including many large cities, around the world.

Arctic sea ice is also melting at a faster rate. The average sea ice extent in May is nearly half a million square miles below the average for 1981-2010. Open ocean is darker than ice and therefore absorbs more sunlight. This creates a positive-feedback loop: the warmer the water, the more rapidly the remaining ice melts, opening more ocean surface, increasing the rate of melting even further, and so on. A warmer ocean also results in a warmer atmosphere, promoting the melting of terrestrial ice. If current trends continue, there will eventually be no more summer sea ice in the Arctic, significantly affecting climate in the northern hemisphere.

One consequence of a warming atmosphere in the Arctic is rapid thawing of permafrost. Field research by a team from the University of Alaska Fairbanks has revealed that permafrost at observed locations in the Canadian Arctic is thawing 70 years earlier than previously predicted.

Permafrost contains huge quantities of organic matter which sequesters carbon, frozen in place for thousands of years. Rapid thawing and consequent decomposition of this organic matter would release vast amounts of methane, contributing significantly to the greenhouse effect warming the atmosphere already resulting from the burning of fossil fuels. This sets up another positive-feedback loop: increasing the greenhouse effect leads to more rapid and extensive permafrost melting, releasing more methane, in turn intensifying the greenhouse effect, thus further accelerating permafrost melting, and so on.

The atmospheric concentration of carbon dioxide, a significant greenhouse gas, recently exceeded 415 parts

per million, the highest in human history. CO2 levels have risen nearly 50 percent since the Industrial Revolution, and the rate of increase is accelerating, with consequent atmospheric temperature rise. According to the Japan Meteorological Agency, this April was the second warmest on record globally. Even more significantly, 18 of the 19 warmest years on record for the planet have occurred since 2000.

The accelerating rate of ice melting occurring around the world, whether from glaciers, ice sheets, sea ice, or permafrost, is a grave warning that climate change is rapidly reaching the point at which its catastrophic consequences will be felt by billions of people, threatening the very existence of civilization.

A massive, worldwide effort is needed in order to halt this dire outcome. Capitalism, divided into rival nation-states, each dominated by a tiny ruling class driven by its own immediate financial self-interest, and hurtling toward world war, is incapable of marshalling the necessary resources to effectively address the problem. The efforts so far, such as the 2015 Paris Agreement, are pathetically inadequate to the task.

In the United States, the Trump administration is actively reversing even the modest measures to address climate change previously enacted and taking steps to cripple and muzzle agencies such as NASA and the EPA from conducting research and conveying that information to the public. Many Democrats, seeking to exploit genuine concern among the population regarding climate change, have made proposals, such as the Green New Deal, which are totally inadequate even in the highly unlikely event they would be implemented.

Only the socialist reorganization of society, in which the vast scientific, technological, and social resources of humanity are mobilized on a coordinated, global scale to confront this challenge, can avert this pending catastrophe.

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