

Antarctic ice sheet melting could accelerate rapidly, leading to catastrophic rise in sea level

By Philip Guelpa
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The effects of a human-induced warming climate, driven by the accumulation of greenhouse gasses in the atmosphere, are accelerating across the globe. These are especially evident near the poles, where warming is progressing more rapidly than in the lower latitudes, because of so-called polar amplification caused by the greater reflection of solar energy by lighter-colored snow and ice as compared to darker bare ground and water. As snow and ice melt, the ratio of lighter to darker surface shifts toward the latter, creating a positive-feedback loop, increasing the rate of melting even further.

In the north, the heat wave in the Siberian Arctic is having devastating consequences for inhabitants of the area. There is also evidence suggesting that the melting of the region's permafrost is releasing large quantities of methane, a greenhouse gas even more potent than carbon dioxide, which will accelerate global warming significantly.

In the south, recent research is revealing that the massive Antarctic ice sheets are melting at an ever-increasing rate, and this is likely to accelerate even more in the future. The consequent influx of water, previously sequestered as ice, into the world's oceans will dramatically raise sea levels, with potentially catastrophic consequences for humanity.

Already, between 2003 and 2019, a NASA study revealed that the Antarctic and Greenland ice sheets combined had lost 118 gigatons (a gigaton is one billion metric tons) and 200 gigatons, respectively, of ice per year. The total is enough to fill Lake Michigan and has caused about half an inch rise in sea level. Greenland alone holds enough ice to raise global sea levels as much as 7 meters (23 feet). If all the Antarctic

ice were to melt, that would raise sea levels by approximately an additional 60 meters (nearly 200 feet). If all the world's glaciers and ice sheets were to melt, extensive areas of land would be inundated, causing massive displacement of human populations and incalculable economic disruption.

It is currently estimated that if present trends of melting continue, sea levels could rise between approximately 1 and 2.4 meters (3 to 8 feet) by the end of the century. The danger posed is not only in the quantity of land that would be submerged, but also the rate at which this would occur.

Recent research by scientists from the Scott Polar Research Institute at the University of Cambridge, using geological data collected by remotely operated submersibles, has revealed that at the end of the last Ice Age (Pleistocene), roughly 12,000 years ago, Antarctic ice sheets retreated (i.e., melted back) at the rate of up to 50 meters (164 feet) per day, or 10 kilometers (6.2) miles per year. That is approximately 10 times faster than the maximum rate currently being observed and greatly exceeds the projections of potential melting that have previously been made.

The Cambridge researchers warn that if global temperature continues to rise, the much greater rate of late Pleistocene melting could be reached again. If this were to happen, or even be approached, the consequent acceleration in the rate of global sea level rise would be truly catastrophic. Hundreds of millions of people could be displaced, with little time for the necessary adjustments to be made in the receiving areas, vastly dwarfing the effects of the current refugee crisis.

Scientific research already indicates that the concentration of the greenhouse gas carbon dioxide in

the atmosphere is at its highest level in the last 800,000 years, before the onset of the first major Pleistocene glacial advance. However, a recent finding, published in *GeoScienceWorld*, suggests that the current concentration of carbon dioxide in the atmosphere is not only higher than at any time in human history or at any time during the warm intervals (interglacials) during the Pleistocene (spanning from 2.58 million years ago to 12,000 years ago), but the highest in at least 23 million years. In either case, the clear implication is that the melting of the world's glaciers and ice sheet will continue and accelerate.

Overall, melting of ice on land from all sources is adding 750 gigatons of water to the world's oceans annually. This causes both slow permanent inundation of coastal areas and temporary inundation during storms and tidal cycles (so called "sunny day flooding"). These effects are already noticeable in many parts of the world. In the southeastern United States, the entire Atlantic and Gulf coasts are vulnerable to varying degrees of inundation. A number of areas on the Pacific coast are moderately to highly vulnerable as well.

A new study by the National Oceanic and Atmospheric Administration (NOAA) reports that high-tide flooding (more than half a meter or 20 inches above normal high tide) has increased five-fold in some cities along the Atlantic and Gulf coasts since 2000, causing damage to buildings and infrastructure, such as water and sewer systems. By 2030, NOAA estimates the number of such incidents could double or triple. Overall, sea levels were approximately 13 inches (33 centimeters) higher in 2019 than in 1920.

In New York City alone, which has 520 miles (837 kilometers) of coastline, mitigation of annual flooding due to potential sea level rise would, by some estimates, run to \$25 billion. So far, only a very limited number of flood protection projects, covering a fraction of the city's coastline, have even reached the planning stage. One event, Superstorm Sandy, back in 2012, resulting in extensive flooding of low-lying areas, caused around \$19 billion in damage to the city alone and \$70 billion overall.

As with the COVID-19 pandemic, climate change constitutes an existential crisis for humanity which can only be countered by a unified, coordinated, scientifically directed effort marshaling all the world's

resources. Only the working class has the power to counter this catastrophic situation. Workers, faced with the devastation being wrought by capitalism, are already rising up against the homicidal policies of the ruling class. What is needed is for this movement to adopt a socialist program that will prioritize the health, safety, and well-being of people over the profits of the ruling elite.

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