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Sea levels may rise more rapidly due to Greenland ice melt

Run-off from vast ice sheet is increasing due to manmade global warming, says study

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Rising sea levels could become overwhelming sooner than previously believed, according to the authors of the most comprehensive study yet of the accelerating ice melt in Greenland.

Run-off from this vast northern ice sheet - currently the biggest single source of meltwater adding to the volume of the world's oceans - is 50% higher than pre-industrial levels and increasing exponentially as a result of manmade global warming, says the paper, published in *Nature* on Wednesday.

Almost all of the increase has occurred in the past two decades - a jolt upwards after several centuries of relative stability. This suggests the ice sheet becomes more sensitive as temperatures go up.

“Greenland ice is melting more in recent decades than at any point in at least the last four

centuries, and probably more than at any time in the last seven to eight millennia,” said the lead author Luke Trusel, of Rowan University.

“We demonstrate that Greenland ice is more sensitive to warming today than in the past - it responds non-linearly due to positive feedbacks inherent to the system. Warming means more today than it did even just a few decades ago.”

The researchers used ice core data from three locations to build the first multi-century record of temperature, surface melt and run-off in Greenland. Going back 339 years, they found the first sign of meltwater increase began along with the industrial revolution in the mid-1800s. The trend remained within the natural variation until the 1990s, since when it has spiked far outside of the usual nine- to 13-year cycles.

Greenland currently contributes about 20% of global sea-level rise, which is running at 4mm per year. This pace will probably double by the end of the century, according to the most recent models used by the UN Intergovernmental Panel on Climate Change. How the new study affects those projections will be the subjects of future study by the authors. If all the ice in Greenland melted, it would raise sea levels by seven metres. At the current pace that would take thousands of years, but the ongoing acceleration could bring this forward rapidly.

“At some point, sea-level rise will be too fast for us to adapt to, so we really have to avoid this situation by reducing emissions,” said the study’s co-author Michiel van den Broeke of Utrecht University. “I think this is one of the many wake-up calls that we have had in the last few decades. It clearly links manmade global warming to sea-level rise.”

The research comes out as policymakers from around the world are attending UN climate talks in Katowice, Poland, where governments are trying to set new rules to keep global warming to between 1.5C and 2C. The authors said the paper underlined the dangers of exceeding even the lower figure.

“On a personal level it is worrying to see this - along with the vast array of other scientific evidence showing that we’ve entered unprecedented or exceptional times,” said Trusel.

“The ice has no political agenda - it either grows or melts. Today it is melting as humans have warmed the planet. The ice sheets have tipping points, and how quickly they impact our livelihoods through sea level rise depends on what we do now and in the very near future.”

Other academics, uninvolved in the paper, said the new study was an important confirmation of what scientists have long suspected: that the recent increase in ice melt is ominously unusual.

“The Greenland ice sheet is like a sleeping giant who is slowly but surely awakening to ongoing global warming, and there are surprises in its response. However, the response may be more rapid than previously believed,” said Edward Hanna, professor of climate science and meteorology at the University of Lincoln.

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