

Global ice loss increases at record rate

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Meltstream cuts through Greenland ice sheet. Credit: Ian Joughin

The rate at which ice is disappearing across the planet is speeding up, according to new research.

And the findings also reveal that the Earth lost 28 trillion tonnes of ice between 1994 and 2017—equivalent to a sheet of ice 100 metres thick

covering the whole of the UK.

The figures have been published today (Monday, 25 January) by a research team which is the first to carry out a survey of global ice loss using [satellite data](#).

The team, led by the University of Leeds, found that the rate of ice loss from the Earth has increased markedly within the past three decades, from 0.8 trillion tons per year in the 1990s to 1.3 trillion tons per year by 2017.

Ice melt across the globe raises sea levels, increases the risk of flooding to coastal communities, and threatens to wipe out natural habitats which wildlife depend on.

The findings of the research team, which includes the University of Edinburgh, University College London and data science specialists Earthwave, are published in European Geosciences Union's journal *The Cryosphere*.

The research, funded by UK Natural Environment Research Council, shows that overall, there has been a 65 % increase in the rate of ice loss over the 23-year survey. This has been mainly driven by steep rises in losses from the [polar ice sheets](#) in Antarctica and Greenland.

Lead author Dr. Thomas Slater, a Research Fellow at Leeds' Centre for Polar Observation and Modelling, said: "Although every region we studied lost ice, losses from the Antarctic and Greenland ice sheets have accelerated the most.

"The ice sheets are now following the worst-case climate warming scenarios set out by the Intergovernmental Panel on Climate Change. Sea-level rise on this scale will have very serious impacts on coastal

communities this century."

Dr. Slater said the study was the first of its kind to examine all the ice that is disappearing on Earth, using satellite observations .

He added: "Over the past three decades there's been a huge international effort to understand what's happening to individual components in Earth's ice system, revolutionised by satellites which allow us to routinely monitor the vast and inhospitable regions where ice can be found.

"Our study is the first to combine these efforts and look at all the ice that is being lost from the entire planet."

The increase in ice loss has been triggered by warming of the atmosphere and oceans, which have warmed by 0.26°C and 0.12°C per decade since the 1980, respectively. The majority of all ice loss was driven by atmospheric melting (68 %), with the remaining losses (32%) being driven by oceanic melting.

The survey covers 215,000 mountain glaciers spread around the planet, the polar ice sheets in Greenland and Antarctica, the ice shelves floating around Antarctica, and sea ice drifting in the Arctic and Southern Oceans.

Rising atmospheric temperatures have been the main driver of the decline in Arctic sea ice and mountain glaciers across the globe, while rising ocean temperatures have increased the melting of the Antarctic ice sheet. For the Greenland ice sheet and Antarctic ice shelves, ice losses have been triggered by a combination of rising ocean and atmospheric temperatures.

During the survey period, every category lost ice, but the biggest losses

were from Arctic Sea ice (7.6 trillion tons) and Antarctic ice shelves (6.5 trillion tons), both of which float on the polar oceans.

Dr. Isobel Lawrence, a Research Fellow at Leeds' Centre for Polar Observation and Modelling, said: "Sea ice loss doesn't contribute directly to sea level rise but it does have an indirect influence. One of the key roles of Arctic sea ice is to reflect solar radiation back into space which helps keep the Arctic cool.

"As the sea ice shrinks, more solar energy is being absorbed by the oceans and atmosphere, causing the Arctic to warm faster than anywhere else on the planet.

"Not only is this speeding up sea ice melt, it's also exacerbating the melting of glaciers and ice sheets which causes sea levels to rise."

Half of all losses were from ice on land—including 6.1 trillion tons from mountain glaciers, 3.8 trillion tons from the Greenland ice sheet, and 2.5 trillion tons from the Antarctic ice sheet. These losses have raised global sea levels by 35 millimetres.

It is estimated that for every centimetre of sea level rise, approximately a million people are in danger of being displaced from low-lying homelands.

Despite storing only 1 % of the Earth's total ice volume, glaciers have contributed to almost a quarter of the global ice losses over the study period, with all glacier regions around the world losing ice.

Report co-author and Ph.D. researcher Inès Ootosaka, also from Leeds' Centre for Polar Observation and Modelling, said: "As well as contributing to global mean sea level rise, [mountain glaciers](#) are also critical as a freshwater resource for local communities.

"The retreat of glaciers around the world is therefore of crucial importance at both local and global scales."

Just over half (58 %) of the ice loss was from the northern hemisphere, and the remainder (42 %) was from the southern hemisphere.

More information: *The Cryosphere* (2021). [DOI: 10.5194/tc-15-233-2021](https://doi.org/10.5194/tc-15-233-2021)

Provided by University of Leeds

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