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Press release

MARUM - Zentrum für Marine Umweltwissenschaften an der Universität Bremen
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New Study: Significant Global Glacier Loss Inevitable

If global temperatures rise by 2.7 degrees Celsius – in line with current climate policy – only a quarter of the glacier masses will be left. This is the result of an international study involving the University of Bremen, which has been published in Science journal.

The results of the study show that if warming were limited to 1.5 degrees Celsius, which corresponds to the target of the Paris Climate Agreement, just over half of the glacier mass could be preserved.

For the study, a team of 21 scientists from ten countries used eight glacier models to calculate the long-term ice loss of more than 200,000 glaciers outside Greenland and Antarctica. They took a wide range of global temperature scenarios into account. For each scenario, the researchers assumed that temperatures would remain constant for thousands of years.

The results are alarming: Even without further global warming – that is, if global temperatures were to stabilize at today's level of 1.2 degrees Celsius – 39 percent of the world's glacier mass would disappear. This is due to the glaciers' delayed reaction to climate change. This already certain glacier melt will contribute over ten centimeters to global sea level rise and every additional 0.1 degrees Celsius of warming will lead to about two percent more loss of glacier ice, according to the international team's forecast.

Professor Ben Marzeion from MARUM – Center for Marine Environmental Sciences at the University of Bremen is involved in the study. “The results underline the fact that current climate policy plays a decisive role in how glaciers will develop in the future. Not just concerning the coming decades, but also in several hundred years' time. It illustrates the responsibility we carry for generations to come,” emphasizes Marzeion.

“Our study makes it painfully clear that every fraction of a degree matters,” says co-lead author Dr. Harry Zekollari from the Vrije Universiteit Brussel. “The choices we make today will resonate for centuries, determining how much of our glaciers can be preserved”.

In all scenarios, glaciers lose mass rapidly over decades and then melt more slowly for centuries, even if it does not get any warmer. This means that the current warming will continue to affect the glaciers for a long time before they have retreated to higher altitudes and reached a new equilibrium.

"Glaciers are good indicators of climate change because their retreat allows us to see with our own eyes how climate is changing. However, since they adjust over longer timescales, their current size vastly understates the magnitude of climate change that has already happened. The situation for glaciers is actually far worse than visible in the mountains today," says co-lead author Dr. Lilian Schuster from the University of Innsbruck.

Glacier retreat not only affects sea levels, but also has far-reaching consequences for the availability of fresh water, increases the risk of glacier-related hazards, and threatens glacier-based tourism. These changes are already making themselves felt in many regions and underline the importance of a global climate policy.

Contribution to the International Year of Glacier Preservation 2025

The study is an important contribution to the United Nations International Year of Glacier Preservation (2025) and underlines the urgent need for global climate action to save the world's glaciers. The research was conducted as part of the Glacier Model Intercomparison Project (GlacierMIP), coordinated by the Climate and Cryosphere (CliC) project of the World Climate Research Program WCRP.

Involved Institutes:

- Vrije Universiteit Brussel, Belgium
- Laboratory of Hydraulics, Hydrology and Glaciology (VAW), ETH Zurich, Schweiz
- Laboratoire de Glaciologie, Université libre de Bruxelles, Belgien
- Department of Atmospheric and Cryospheric Sciences (ACINN), Universität Innsbruck, Österreich
- Bristol Glaciology Centre, School of Geographical Sciences, University of Bristol, Großbritannien
- Department of Geosciences, University of Oslo, Norwegen
- Geophysical Institute, University of Alaska Fairbanks, USA
- Institute of Geography, University of Bremen, Germany
- MARUM – Center for Marine Environmental Sciences, University of Bremen, Germany
- Department of Civil and Environmental Engineering, Carnegie Mellon University, Pittsburgh, USA
- Swiss Federal Institute for Forest, Snow and Landscape Research (WSL), bâtiment ALPOLE, Sion, Schweiz
- Swiss Reinsurance Company Ltd (Swiss Re), Zürich, Schweiz
- Graduate School of Environmental Studies, Nagoya University, Japan
- Department of Geosciences, University of Fribourg, Schweiz
- Department of Geography, King’s College London, Großbritannien
- Department of Physical Geography, Utrecht University, Niederlande
- NSF National Center for Atmospheric Research, Boulder, USA
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Glacier at Caullaraju in Peru.
Ben Marzeion
Universität Bremen, Ben Marzeion

Field work to measure the mass balance on the Shallap glacier in Peru.
Ben Marzeion
Universität Bremen, Ben Marzeion