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# Global glacier mass change in 2025

The WGMS Network

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Glaciers lost 408 ± 132 Gt of mass during the hydrological year 2025, equivalent to 1.1 ± 0.4 mm sea-level rise. Since 1975, glacier mass loss has totalled 9,583 ± 1,211 Gt, equivalent to 26.4 ± 3.3 mm of sea-level rise, with six of the highest mass-loss years on record occurring in the past seven years.

Glaciers that are separate from the continental ice sheets in Greenland and Antarctica covered approximately 706,000 km$^2$ around the year 2000 (ref. 1), with an estimated total volume of 158,170 ± 41,030 km$^3$. This glacier volume is equivalent to a potential sea-level rise of 324 ± 84 mm, after converting glacier volume to mass and accounting for 15.1% of the ice presently located below sea level[2]. Glaciers are key indicators of climate change, and glacier melting has implications for local and downstream geohazards and ecology, regional water resources and water quality, and global energy and sea-level budgets. In fact, the contribution of glacier mass loss to global sea-level rise is second largest following the thermal expansion of ocean water, and surpasses the individual contributions from the Greenland and Antarctic ice sheets in the past 25 years[3,4].

Observations of glacier change provide a baseline to quantify the impacts of glacier melting. The World Glacier Monitoring Service (WGMS) and predecessor organizations have been coordinating international glacier monitoring since 1894. The collected observations show a global centennial-scale glacier retreat since the mid-19th century — with intermittent and decadal periods of regional-scale glacier readvance — followed by a historically unprecedented global glacier decline in the 21st century[5]. From 2000 to 2023, glaciers lost about 5% of their mass globally, and between 2% and 39% regionally[3].

Although glacier changes in the early 20th century were partly driven by natural forcings and internal climate variability, glacier mass loss since the 1990s is mainly attributed to anthropogenic greenhouse gas emissions and the subsequent increase in global temperatures[6]. Depending on size and slope, glaciers take decades to centuries to fully respond to climatic changes. As a result, more than one-third of present-day glacier mass is already committed to be lost even if temperatures were stabilized at current conditions[7]. As glacier mass loss is linearly related to temperature increase, every reduction in temperature will help mitigate future glacier mass loss[8] and related impacts.

Here, we assess global and regional glacier mass changes for the hydrological year 2025, which spans from October 2024 to September 2025 in the northern Hemisphere and from April 2024 to March 2025 in the southern Hemisphere. This 2025 assessment is based on in situ glaciological mass-change observations, bias-corrected for past periods using geodetic elevation changes from airborne and satellite surveys[9]. Both glaciological and geodetic datasets were acquired by national networks and research institutions and compiled by the WGMS[9]. Using geostatistical modelling[10], annual mass-balance anomalies were spatially interpolated from a heterogeneously distributed worldwide sample of around 150 glaciological time series. Anomalies were then calibrated with long-term geodetic trends available for individual glaciers and with global coverage from 2000 to 2019 (mainly from ref. 4). The annual time series for each of the world's glaciers from 1976 to 2025 were then aggregated to regional and global estimates of glacier mass changes, considering area changes over time[10]. Note that these estimates do not include mass changes below the water level (not contributing to sea-level rise)[3,4]. Uncertainties are given at the 1.96-sigma level (that is, 95% confidence interval).

## Global glacier mass change

Glaciers globally experienced a net mass loss of 408 ± 132 Gt (or 408 × $10^{12}$ kg) during the hydrological year 2025, which, divided by ocean area (362.5 × $10^6$ km$^2$), is equivalent to 1.1 ± 0.4 mm sea-level rise. As such, 2025 is the sixth-most negative year since global records began in 1975, with all six years exceeding 1 mm sea-level equivalent and occurring in the past seven years (Fig. 1a). Global glacier mass loss has accelerated from less than 100 Gt per year in 1976–1995 (with occasional years with modest mass gain), to around 230 Gt per year in 1996–2015, and 390 Gt per year in 2016–2025. The largest mass gain and mass loss were recorded in 1983 (+115 Gt) and 2023 (−555 Gt), respectively. The annual mass changes since 1975 (Fig. 1b) accumulate to a loss of 9,583 ± 1,211 Gt (equivalent to 26.4 ± 3.3 mm sea-level rise), of which 79% (7,524 ± 688 Gt) occurred since the year 2000. This loss is equivalent to 7.7% (6.2%) of the global glacier mass above sea level in 1975 (2000).

## Regional glacier mass changes

Area-averaged mass changes (kg m$^{-2}$, or millimetre water equivalent) were used to compare glacierized regions of different sizes. The hydrological year 2025 was the fourth consecutive year in which all 19 glacier regions[1] experienced mass loss (Fig. 1c). Annual mass gain only occurred in a few subregions, such as in northern Scandinavia, where record winter accumulation was reported to have overcompensated the strong summer ablation, and in parts of the Andes, with positive

## Key points

- Earth's glaciers, separate from the continental ice sheets in Greenland and Antarctica, experienced a net mass loss of 408 ± 132 Gt during the hydrological year 2025 (equivalent to 1.1 ± 0.4 mm sea-level rise) and a total of 9,583 ± 1,211 Gt (26.4 ± 3.3 mm sea-level rise) since 1975.
- In 2025, regional area-averaged mass loss was largest in Western Canada and USA, Iceland, and Central Europe, with the largest anomalies from the climate period (1991–2020) in Western Canada and USA, South Asia West, and Svalbard.
- Regional contributions to global mass loss in 2025 were largest from High Mountain Asia, Alaska, and the Russian Arctic.

annual balances reported from the Echaurren Norte and Mocho glaciers. The greatest mass loss was observed in Western Canada and USA (1,860 ± 1,097 kg m$^{-2}$), Iceland (1,553 ± 441 kg m$^{-2}$), and Central Europe (1,376 ± 561 kg m$^{-2}$). Compared to the climate period from 1991 to 2020, Western Canada and USA also showed the largest negative regional anomaly (−1,255 kg m$^{-2}$) in 2025, followed by South Asia West (−910 kg m$^{-2}$), and Svalbard (−890 kg m$^{-2}$).

When multiplied by the regional glacier area, the largest contributions to global mass loss in 2025 came from High Mountain Asia (88 ± 32 Gt), Alaska (57 ± 90 Gt), and the Russian Arctic (56 ± 37 Gt). With respect to cumulative global mass loss since 1975, the largest contributions came from regions that combine large glacier cover and negative area-averaged mass changes. The largest mass loss originated from Alaska (2,908 ± 722 Gt), which makes up almost one-third of the

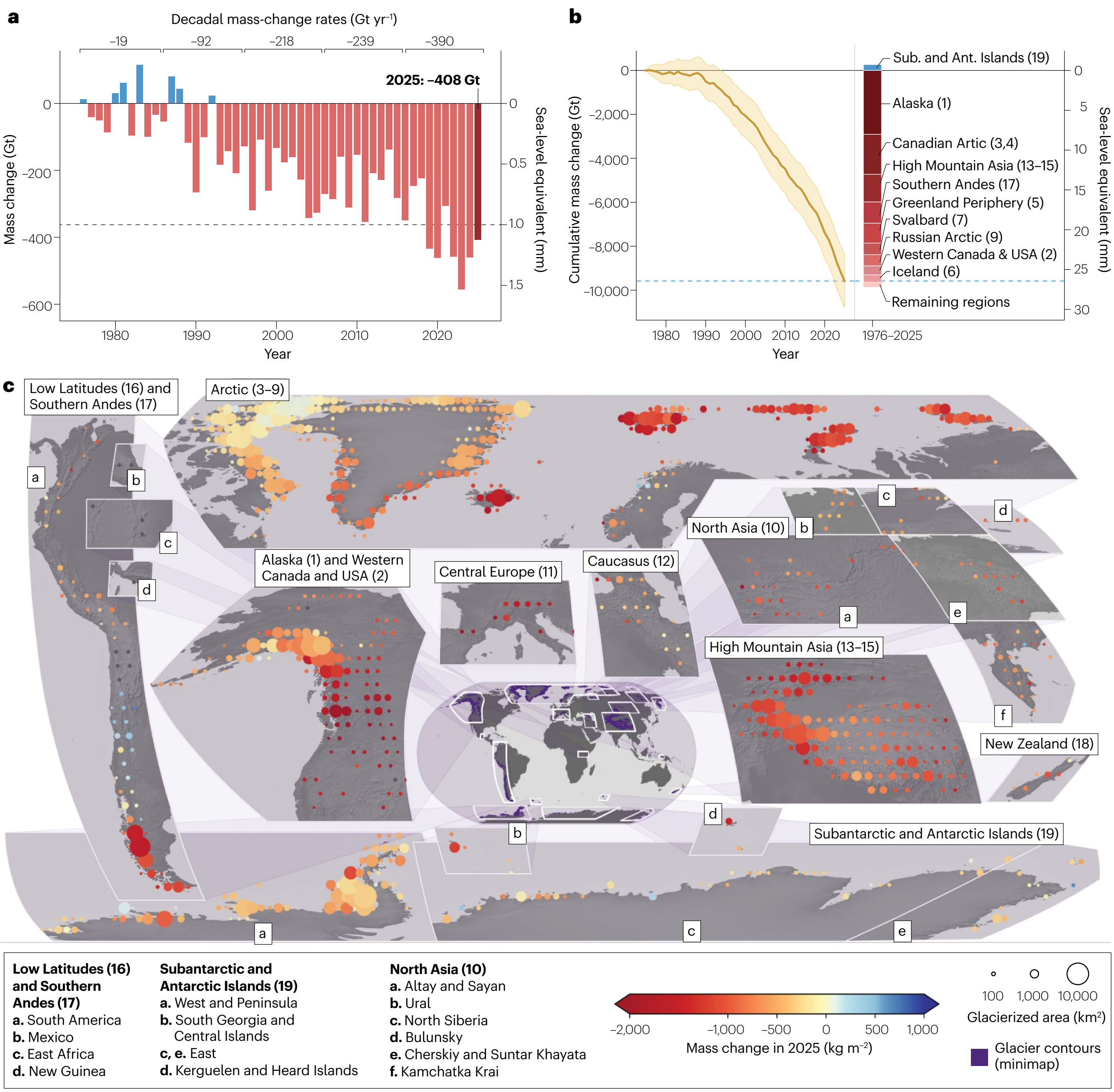


**Fig. 1 | Global glacier mass change for hydrological years 1976–2025.** **a**, Global glacier mass change for hydrological years 1976–2025. Coloured bars indicate years with positive (blue) and negative (red) annual mass changes and highlight the results of 2025 (dark red). Decadal mass-change rates (Gt yr$^{-1}$) are labelled above the *x*-axis. The dashed black line indicates a mass change (362.5 Gt) equivalent to 1 mm sea-level rise. **b**, Cumulative global glacier mass change (yellow line with shaded uncertainty at 95% confidence interval; left) and regional contributions (stacked bars, sorted by amount; right) since 1975. For both subplots, mass change is given in Gt (left *y*-axis) and mm sea-level equivalent (right *y*-axis), with the blue dashed line indicating the total cumulative mass loss 1976–2025. **c**, Regional glacier mass change (kg m$^{-2}$) for the hydrological year 2025 aggregated for tiles of 2° latitude and longitude, shown for the 19 first-order glacier regions[1] (numbers in parentheses) and selected sub-regions (letters). Discs scale with the glacierized area and are coloured according to area-averaged mass change. Data from WGMS (2026)[9]. Map design following Hugonnet et al. (2021, Fig. 2)[4]. In 2025, glaciers continued to lose mass in all regions, with the global mass change ranking as the sixth-most negative on record.

global mass loss, followed by the Canadian Arctic (1,819 ± 320 Gt), High Mountain Asia (1,259 ± 265 Gt), the Southern Andes (969 ± 188 Gt), and peripheral glaciers in Greenland (903 ± 322 Gt). Subantarctic and Antarctic Islands is the only region with a cumulative glacier mass gain (269 ± 727 Gt) since 1975. Even in this region, the trend has changed, and since 2015, mass loss has dominated annual observations.

Caution is warranted when interpreting mass-change estimates in regions with sparse observational coverage, such as High Mountain Asia, the Southern Andes, Arctic Canada South, the Russian Arctic, Greenland, and the Subantarctic and Antarctic Islands. Here, the long-term trend is well constrained by geodetic data (for the period 2000–2019), but the limited coverage and representativeness of the glaciological observations used to derive annual anomalies are subject to increased uncertainty[10].

## Summary

During the hydrological year 2025, Earth's glaciers lost a net of 408 ± 132 Gt of mass, corresponding to 1.1 ± 0.4 mm of sea-level equivalent. It was the fourth consecutive year in which all 19 glacier regions – from the equator to the polar regions – lost mass. The exceptionally high mass-loss rates of the past decade, relative to the remaining mass, suggest that many individual glaciers will soon vanish and that entire regions will lose their glacier cover within a few decades. Continuous glacier monitoring that integrates in situ and remote sensing approaches provides an essential baseline for quantifying current and future glacier changes and their downstream impacts.

## Data availability

The annual mass change time series for individual glaciers, regions, global, and gridded at a spatial resolution of 0.5° latitude and longitude are available from the WGMS (https://doi.org/10.5904/wgms-amce-2026-02-10). The gridded product is also available from the Copernicus Climate Data Store (https://doi.org/10.24381/cds.ba597449). As input data, we used the glaciological and geodetic observations from the Fluctuations of Glaciers database[9] (https://doi.org/10.5904/wgms-fog-2026-02-10), the GTN-G glacier regions (https://doi.org/10.5904/gtng-glacreg-2017-07), and the glacier outlines from the Randolph Glacier Inventory 6.0 (ref. 1, https://doi.org/10.7265/4m1f-gd79) and from the Greater Caucasus Glacier Inventory (https://doi.org/10.7265/N5V98602; submission 642 by L. Tielidze).

## Code availability

The code for implementing our approach is available on GitHub (https://github.com/wgms-org/amce). Version 2026-02-10 was used to produce the results presented here.

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## Author contributions

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## Competing interests

The authors declare no competing interests.

## Related links

**Copernicus Climate Change Service (C3S) glacier mass-change product:** https://doi.org/10.24381/cds.ba597449
**World Glacier Monitoring Service (WGMS):** https://wgms.ch