Annual mass balance of Swiss glaciers in 2024/2025

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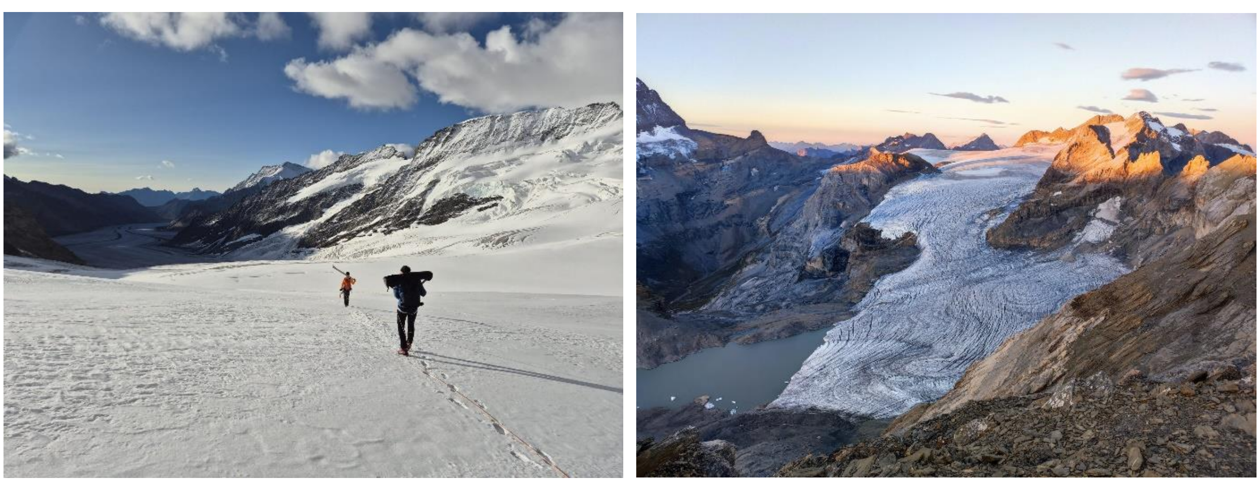
Summary

The annual ice loss was measured on 20 glaciers throughout Switzerland within the programme Glacier Monitoring Switzerland (GLAMOS) in September 2025. These measurements extend multi-decadal observational series that are essential to document the decline of mountain glaciers, and to understand the corresponding impacts. This year's results show a continuation of the very rapid ice loss. After a winter season with little snow, especially in the Northeastern part of the Swiss Alps, a heat wave in June intermittently pushed the mass balance to the second-lowest value on record, just after the extreme year 2022. Cooler conditions and some fresh snow in July however avoided the worst ice loss. With an average mass balance of –1.6 meters water equivalent, the hydrological year 2024/2025 is clearly more negative than the average 2010-2020. Extrapolated to all glaciers, this corresponds to further reduction of the Swiss ice volume by 3.0%. This loss does not reach that of the record years 2022 and 2023 but contributes to the by far most negative decade ever: Since 2015 one quarter of the Swiss glacier volume has been lost.

Zusammenfassung

Im Rahmen des Schweizer Gletschermessnetzes (GLAMOS) wurde im September 2025 der jährliche Eisverlust auf rund 20 Gletschern in der ganzen Schweiz ermittelt. Diese Messungen fügen sich in eine langjährige Beobachtungsreihe ein, die zentral ist, um den Gletscher-Rückgang zu dokumentieren und um die Auswirkungen zu verstehen. Die diesjährigen Ergebnisse zeigen eine Fortsetzung des sehr schnellen Eisverlustes. Nach einer Wintersaison mit wenig Schnee, insbesondere im Nordosten der Schweiz, führte eine Hitzewelle im Juni dazu, dass die Massenbilanz bis Anfang Juli auf den zweitschlechtesten Wert seit Messbeginn erreichte, direkt nach dem Extremjahr 2022. Kühlere Wetterbedingungen im Juli verhinderten jedoch den schlimmsten Eisverlust. Mit einer durchschnittlichen Massenbilanz von –1,6 Metern Wasserwert ist das Jahr 2024/2025 deutlich negativer als der Durchschnitt der Jahre 2010-2020. Hochgerechnet auf alle Schweizer Gletscher entspricht dies einem weiteren Rückgang des Eisvolumens um 3,0%. Dieser Verlust erreicht nicht das Ausmass der Rekordjahre 2022 und 2023, trägt jedoch zur bislang negativsten Dekade bei: Seit 2015 ging ein Viertel des Schweizer Gletschervolumens verloren.



(Left) A team of glaciologists descending over Great Aletschgletscher. (Right) Claridenfirn was completely snow-free in September 2025. Photos: R Moser / M. Huss

1. Measurements and basic approach

Within the standard observational programme of Glacier Monitoring Switzerland (GLAMOS) 23 glaciers were visited for end-of-summer measurements of ice melt and (where applicable) firn accumulation in September 2025 (Fig. 1). The aim of these surveys is to determine the glacier-wide annual mass balance, and thus to prolong multi-decadal observational series that are crucial for understanding the effects of shifts in climate on glacier change. The annual mass balance refers to the total mass added to or removed from each glacier over one year and corresponds to the sum of winter snow accumulation and summer melting of snow, firn and ice.

Long-term measurement programmes (>100 years in some cases) are ongoing on the surveyed glaciers that are distributed throughout all glacierized mountain regions of the Swiss Alps. The surveys were intensified with additional monitoring sites ca. 10-20 years ago, also with more detailed measurements of snow water equivalent on glaciers at the end of the winter season (see GLAMOS, 2025) to infer seasonal mass balance. Insights into seasonal mass balance dynamics are crucial to disentangle the effects of snow accumulation (determined by variations in solid precipitation) and snow/firn/ice melt (determined by variations in air temperature and solar radiation).

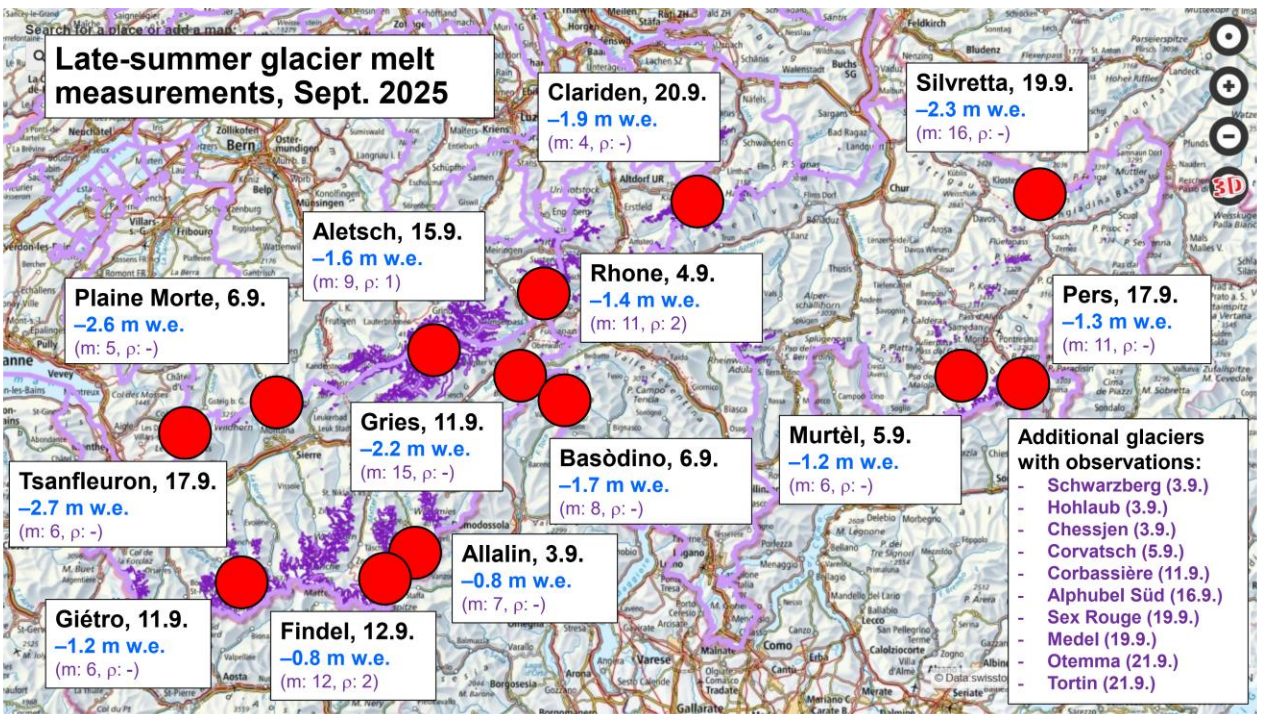


Figure 1: Overview of mass balance measurements performed on Swiss glaciers in September 2025. For glaciers with important long-term observations (boxes) the date of the survey, as well as the glacier-wide annual mass balance (blue) in meters water equivalent (m w.e.) is given. Values are homogenized to the hydrological year (1.10.-30.9.) for comparability. The number of point mass balance measurements (*m*) and the number of firn density measurements (*ρ*), if applicable, is stated. Light purple boundaries show hydrological catchments. Visits on additional glaciers with shorter series or lower observational intensity are listed on the lower right.

On each glacier, a network of between 4 and 16 point measurement sites allows estimating the glacier-wide annual mass balance. Aluminium or plastic poles are drilled into the ice and provide an accurate local observation of the ice layer removed at the specific location over time periods of about one year linking the end of subsequent melt seasons (GLAMOS, 2024a). These mass balance stakes are redrilled at their original location during the late-summer survey to compensate for local ice flow. In the accumulation area, mass balance stakes allow locating a snowed-in surface horizon marked by sawdust down to which the snow depth and the density of the accumulated snow is sampled (GLAMOS, 2021). Subsequently, all point measurements of ice ablation/firn accumulation are converted to water equivalent and are spatially extrapolated to the scale of the entire glacier using a model-based approach that is optimally taking the spatial variability and inhomogeneities in sampling into account (Huss et al., 2021; GLAMOS, 2024b, Appendix A.1). Furthermore, this approach resolves the daily glacier-wide mass balance and thus allows homogenizing the results to common and thus comparable time periods, e.g. the hydrological year (1 October to 30 September).

Measurement conditions in late summer 2025 were characterized by relatively unstable weather but sunny periods in specific regions of the Swiss Alps. This allowed us to complete all relevant glacier observations before 21 September (Fig. 1, Appendix A.1). This was followed by a rainy period and significant cooling with fresh snow. At some sites surveys may be repeated later in the year, depending on conditions, to complement the data set or capture melt processes occurring after the late-summer survey. In general, substantial ice ablation was observed, necessitating the redrilling of almost all measurement stakes. While on smaller / low-lying glaciers all winter snow has disappeared, snow accumulation was present at the highest elevations, and measurements of firn density have been acquired on three glaciers.

2. Results

Summary figures for all investigated glaciers are shown and interpreted below. The Appendix contains glacier-specific figures allowing in-depth insights regarding different variables, such as the spatial distribution of annual surface mass balance over the glacier, the temporal dynamics of glacier mass change, or the relation of the year 2024/2025 with respect to previous periods.

Point observations of mass balance at the measurement sites were less negative than in the two extreme years of 2022 and 2023 almost everywhere. In many cases, the results were relatively similar to the observations of the year 2024 (Appendix A.2). Notable exceptions are Glacier du Tsanfleuron and Glacier de la Plaine Morte at the border between the cantons of Bern and Valais that showed the second-most negative mass balance (after 2022) recorded so far. The highest ablation rates observed reach 7-8 meters of local ice loss for the annual period on glacier tongues extending to low elevation (e.g. Findel, Rhone) and even about 12 meters for the lowermost site on Grosser Aletschgletscher (at 1980 m a.s.l.). Local snow accumulation, and thus formation of new firn has been observed above ca. 3100-3300 m a.s.l. (depending on the region). The highest measurement sites on Grosser Aletschgletscher, Findelgletscher and Rhonegletscher experienced snow accumulation of ca. 2 meters. These conditions with winter snow preserved over the summer season and, hence formation of new firn/ice, however, only prevailed for large glaciers reaching high elevations, while two thirds of the monitored glaciers completely lost their snow coverage throughout the summer months. On these glaciers even the topmost measurement points experienced melt rates of 0.5 to 3 meters (e.g. Gries, Giétro, Otemma, Plaine Morte, Silvretta, Tsanfleuron).

Glacier-wide annual mass balance observed for the hydrological year 2024/2025 is slightly to substantially below the average of the period 2010-2020, considered here as a reference (Fig. 2). As absolute values of glacier-wide mass balance (Fig. 3) are difficult to be directly compared among glaciers due to differing long-term trends (e.g. Fischer et al., 2015; Hugonnet et al., 2021), we here mainly discuss the individual glaciers' deviation from their mean. The most negative annual mass balance anomaly has been recorded for Silvrettagletscher (northeastern Switzerland). This is attributed to record-low winter snow accumulation on that glacier with respect to over 100 years of observations (GLAMOS, 2025). However, all monitored glaciers except those in the Southern Valais showed losses significantly higher than the average. This most importantly refers to Clariden, Plaine Morte, Tsanfleuron, but also to Gries and Basòdino. Measurements for glaciers in the Engadin (Murtèl, Pers), Rhone and Grosser Aletsch show results moderately below the 2010-2020 mean. The situation in 2025 was least severe for glaciers in the Matter- and Saas valleys (e.g. Allalin, Findel, Hohlaub). Even though the mass balance in these regions was clearly negative, it was only slightly below the average.

On the one hand, the reason for these spatial differences can be attributed to **variations in winter precipitation**: While end-of-winter snow water equivalent (30 April) on glaciers in Northeastern Switzerland was 25-50% below the average, it was close to or only slightly below the average in other regions (GLAMOS, 2025). The best conditions in late winter prevailed in the Southern Valais, where an exceptional snow precipitation event in mid-April 2025 annihilated the deficits of the previous course of the season. On the other hand, like in 2024, a **clear elevation-dependence** of glacier-specific mass balance is visible in 2025: Low-lying glaciers with their highest regions barely extending beyond 3000 m a.s.l. showed particularly negative mass balance, while glaciers reaching to higher elevations suffered less. This can be explained with the meteorological variations throughout the summer 2025 with extreme melting in June, importantly affecting the low elevations (where glaciers were snow-free already), and repeated fresh snow falls in July and August, mainly supporting elevations at higher elevation.

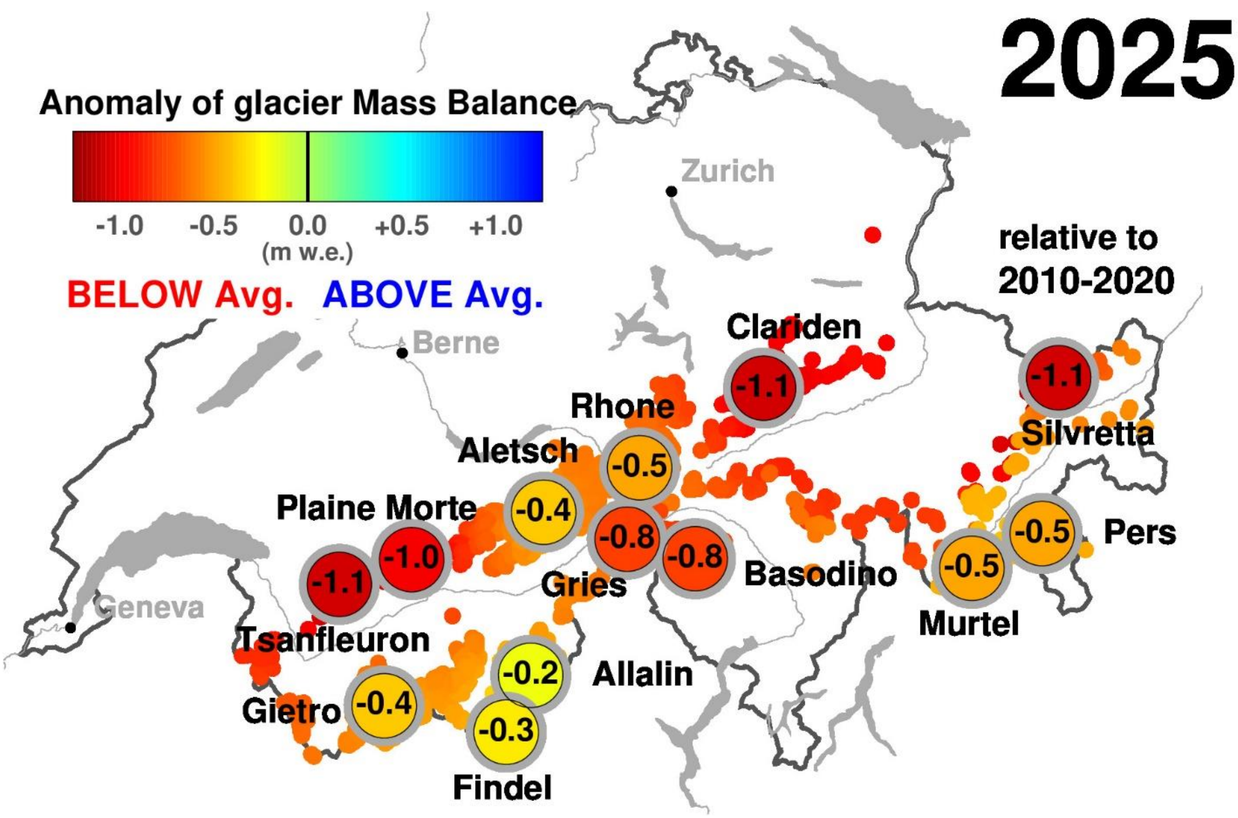


Figure 2: Anomaly of glacier-wide annual mass balance for the most important surveyed glaciers over the hydrological year (1 Oct. 2024 to 30 Sept. 2025) relative to the average of the period 2010-2020 in meters water equivalent (m w.e.). Smaller dots show the mass balance anomaly extrapolated to other glaciers in Switzerland for better visualizing the pattern. Yellow-red colours indicate below-average conditions with respect to glacier mass balance, and green-blue colours above-average conditions.

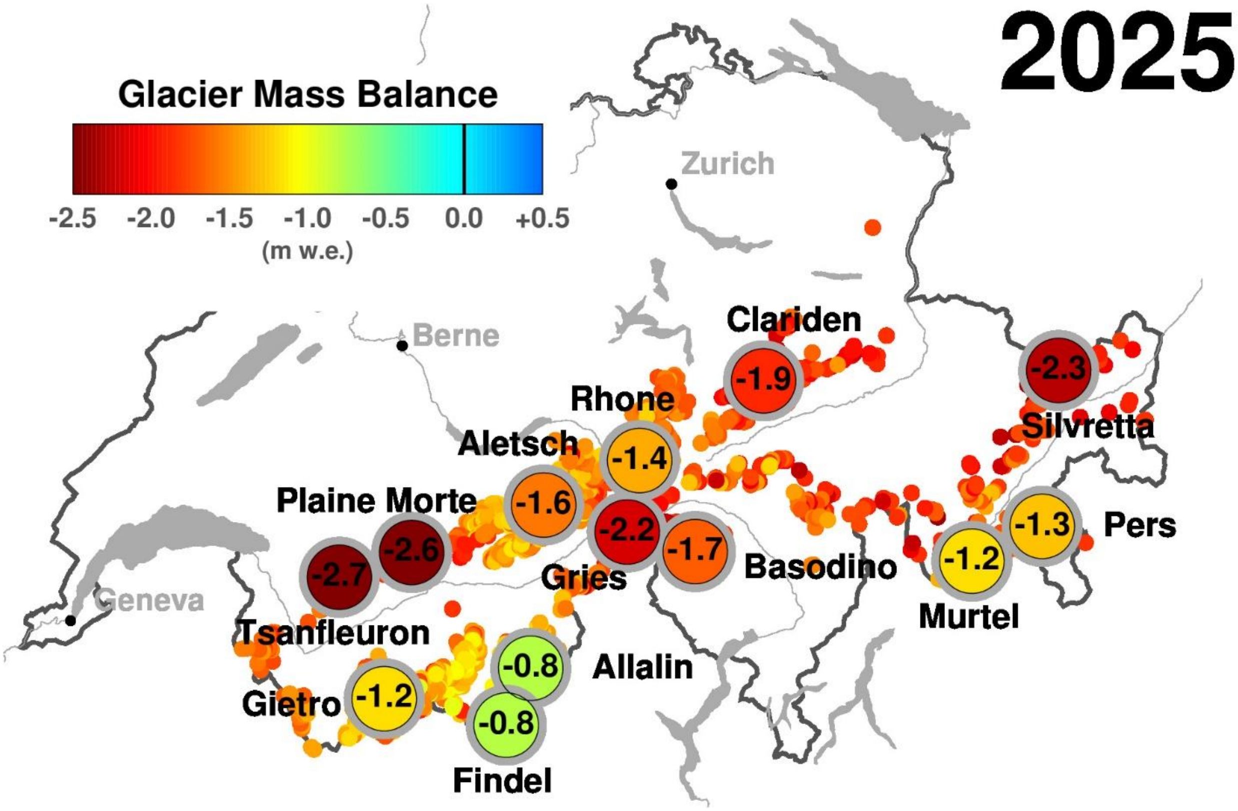


Figure 3: Glacier-wide annual mass balance for the most important surveyed glaciers over the hydrological year (1 Oct. 2024 to 30 Sept. 2025) in meters water equivalent (m w.e.). Smaller dots show the mass balance extrapolated to other glaciers in Switzerland. Note that the mass balance may strongly vary between neighbouring glaciers, and the monitored sites show different long-term average mass balance.

The situation for glaciers in the Swiss Alps was most critical at the end of the mostly very dry winter season with a Swiss-wide snow deficit of 13% (GLAMOS, 2025). In terms of air temperature, June 2025 ranks second after 2003. At very high elevation (Jungfraujoch, 3580 m a.s.l.) it was even the warmest June ever. Correspondingly, glacier mass balance was on track to keep up with the extreme year 2022 in early July and record ice losses seemed within reach. Three factors however turned out to be more favourable to glaciers during the melt-intensive summer months of July and August 2025 in comparison to the years 2022 to 2024:

(1) Even though average summer air temperatures (June to August) were only slightly below those of 2022-2024, the relatively cool month of July was beneficial as this is typically the month with maximal glacier mass loss.
(2) In contrast to the summer periods of 2022-2024, several snow events were registered between July and September. Even though these periods of fresh snow coverage on the bare ice were short-lived, they still efficiently brought melting to zero over a few days which is a significant benefit during the otherwise melt-intensive summer season.
(3) Both in 2022, and even more importantly, in 2024, substantial Saharan dust depositions on the winter snow were observed. The albedo reduction on a dirty snow surface is substantial (e.g. Réveillet et al., 2022), and this effect accelerates the rate of snow depletion. In 2025, no such events were observed, and the winter snow surface remained relatively clean throughout the melting season with a correspondingly high albedo. This therefore reduced melt rates despite high air temperatures.

The evolution of glacier mass balance throughout the hydrological year 2024/2025 started with optimal conditions in October (Fig. 4). Cool temperatures and repeated snow fall events resulted in an early growth of the snow layer on glaciers. From late October until mid-November, however, a warm and dry period triggered additional ice melt on glacier tongues below ca. 2600 m a.s.l. before the actual snow accumulation phase started. While mass balance was only slightly below the 2010-2020 average until the end of January, a dry period lasting until mid-April 2025 resulted in much lower snow depths on glaciers than usual. An exceptional 2-day snow event, however, added partly over 2 metres of snow on glaciers in the Southern Valais and the Ticino, also extending into the Bernese Oberland. This intermittently brought the mass balance back to an average course in these regions (see Appendix A.3). The peak snow accumulation was reached on 29 May which is slightly later than on average. A long-lasting heat wave in the second half of June resulted in extreme melt rates (Fig. 4). The "Glacier loss day" (Voordendag et al., 2023), i.e. the day when overall mass balance becomes negative and all snow mass added during winter is used up, happened on 7 July on average for 12 glaciers with detailed data, the second-earliest date ever after 2022 (Fig. 5). This can be explained by the combination of relatively low end-of-winter snow depth and the early heat in June. After the second week of July cooler weather with repeated snow fall events at the elevation of the glaciers prevailed. This led to relatively limited mass losses during that period, before heat waves returned and were especially relevant in the first half of August. Until the end of the hydrological year, the weather was then characterized by average conditions (Fig. 4).

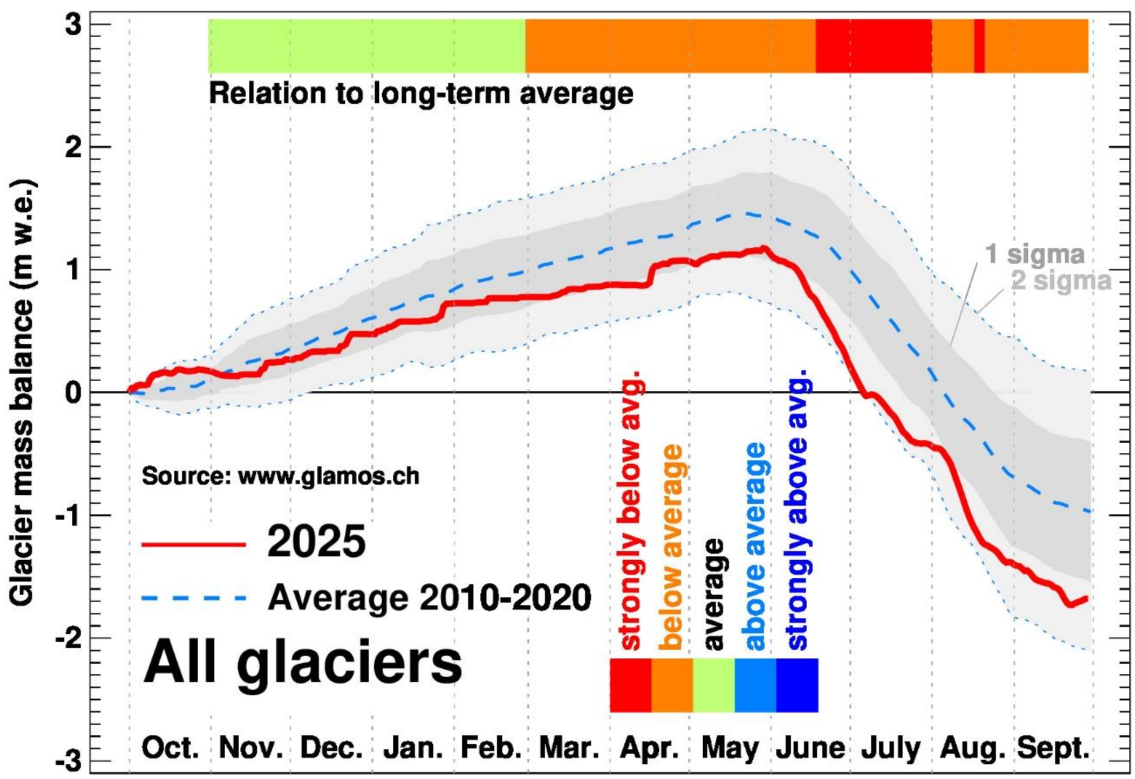


Figure 4: Cumulative daily mass balance in the hydrological year 2024/2025 (red) in comparison to the average and the spread of the years 2010-2020. The top bar indicates periods throughout the year with average (green), below- (orange/red) or above-average (light/dark blue) mass balance. The arithmetic average of the main surveyed glaciers (see Figures 2 and 3) is shown.

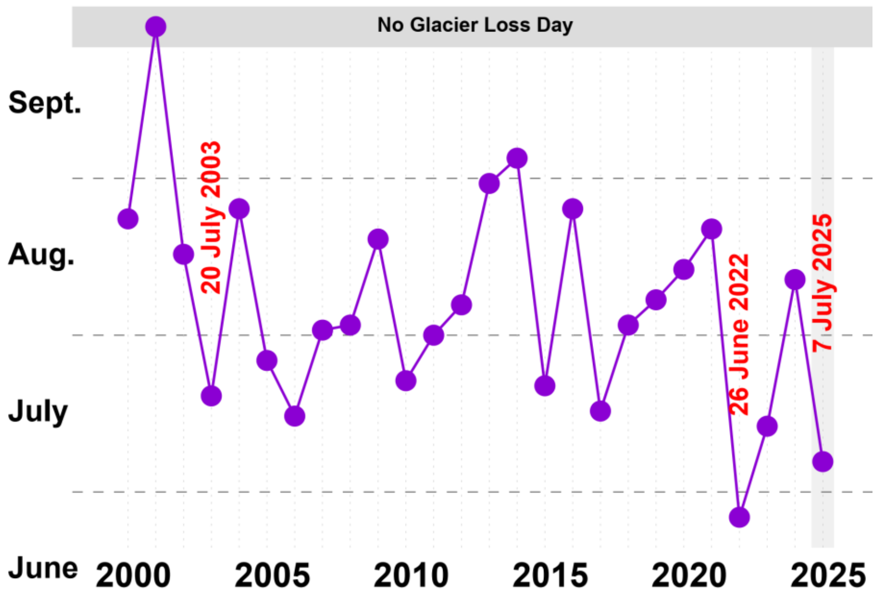


Figure 5: Date of the "Glacier loss day" (Voordendag et al., 2023) since the year 2000 evaluated from the arithmetic average of 12 glaciers (see Fig. 2) with detailed seasonal mass balance surveys. Typically, the Glacier loss day occurred in August, with a clear trend towards earlier occurrence.

Ranking all years since 1950 – observational coverage is only considered sufficient thereafter – illustrates during which periods the glacier year 2025 was most exceptional (Fig. 6). Until late October 2024, conditions were among the best compared to the last seven decades. The rank then continuously decreased over the winter season at a Swiss-wide scale, reaching a first minimum in the warm and dry month of April. During the extremely hot month of June the year 2025 further dropped, reaching rank 2 during the first week of July. Over the summer season the glacier mass balance year 2025 consistently ranked among the four to seven most negative years during the period 1950-2025 (Fig. 6).

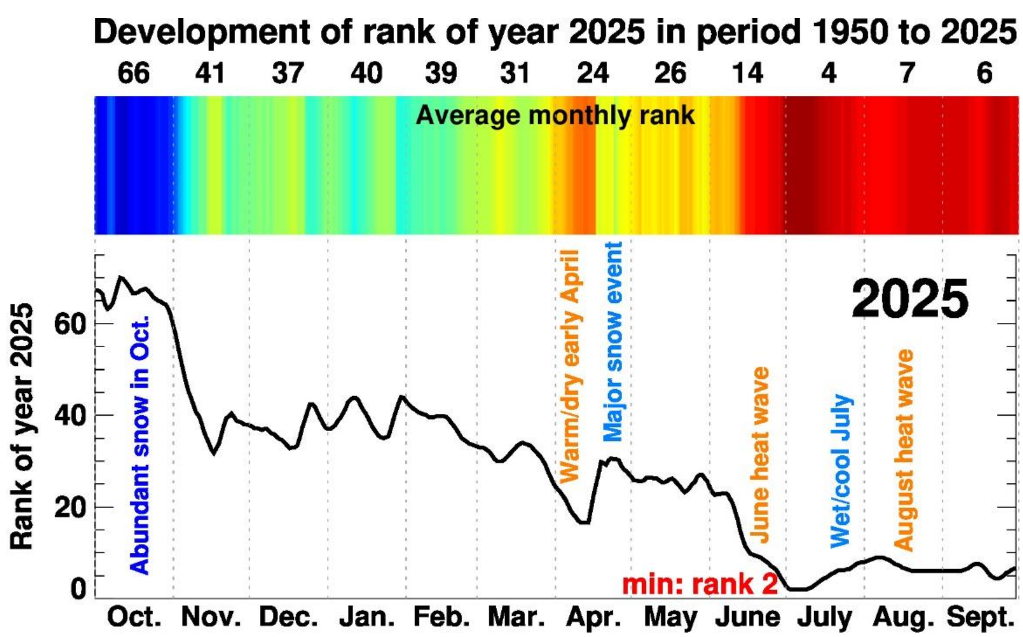


Figure 6: Daily temporal development of the rank of the year 2025 with respect to all individual years 1950 to 2025. Colours (top) visualize the rank from high (blue) to low (red) over the hydrological year, and a time series annotated with special events is shown (bottom). The minimum rank reached in early July is indicated.

For regionalizing the findings on glacier mass balance measured at the ca. 20 sites throughout the Swiss Alps, we extrapolate annual mass balance anomalies homogenized to the hydrological year (1 Oct. - 30 Sept.) to all 1’400 glaciers in the Swiss Glacier Inventory SGI2016 (Linsbauer et al., 2021) according to an approach like proposed in Dussaillant et al. (2025) or van Tiel et al. (2025). We thus account for differences in regional sampling density and include long-term trends of glacier-specific mass loss for all glaciers based on the geodetic mass balance (Fischer et al., 2015). The area of each glacier is updated based on a volume-area-scaling approach to the year 2025. Furthermore, measured seasonal and modelled daily mass balance variations are superimposed on computed annual glacier-specific mass changes, thus permitting long- and short-term dynamics of glacier mass change to be inferred at the scale of the Swiss Alps.

For the hydrological year 2024/2025, an **average mass balance of –1.56 m w.e. yr^{-1}** is found for all Swiss glaciers (Fig. 7). This pales against the values of –3.1 m w.e. and –2.3 m w.e. for 2022 and 2023. Considering the last 20 years, annual mean ice thickness reduction was similar also in 2017 and 2011 but more limited in all other years. Nevertheless, the glacier mass loss for 2025 could have been worse given the below-average winter snow coverage: Considering the summer mass balance anomalies (1 May - 30 Sept.), overall summer melting 2025 was only 15% above the 2010-2020 average. Even though melting was higher than normal, this is the lowest value of the last four years (Fig. 7).

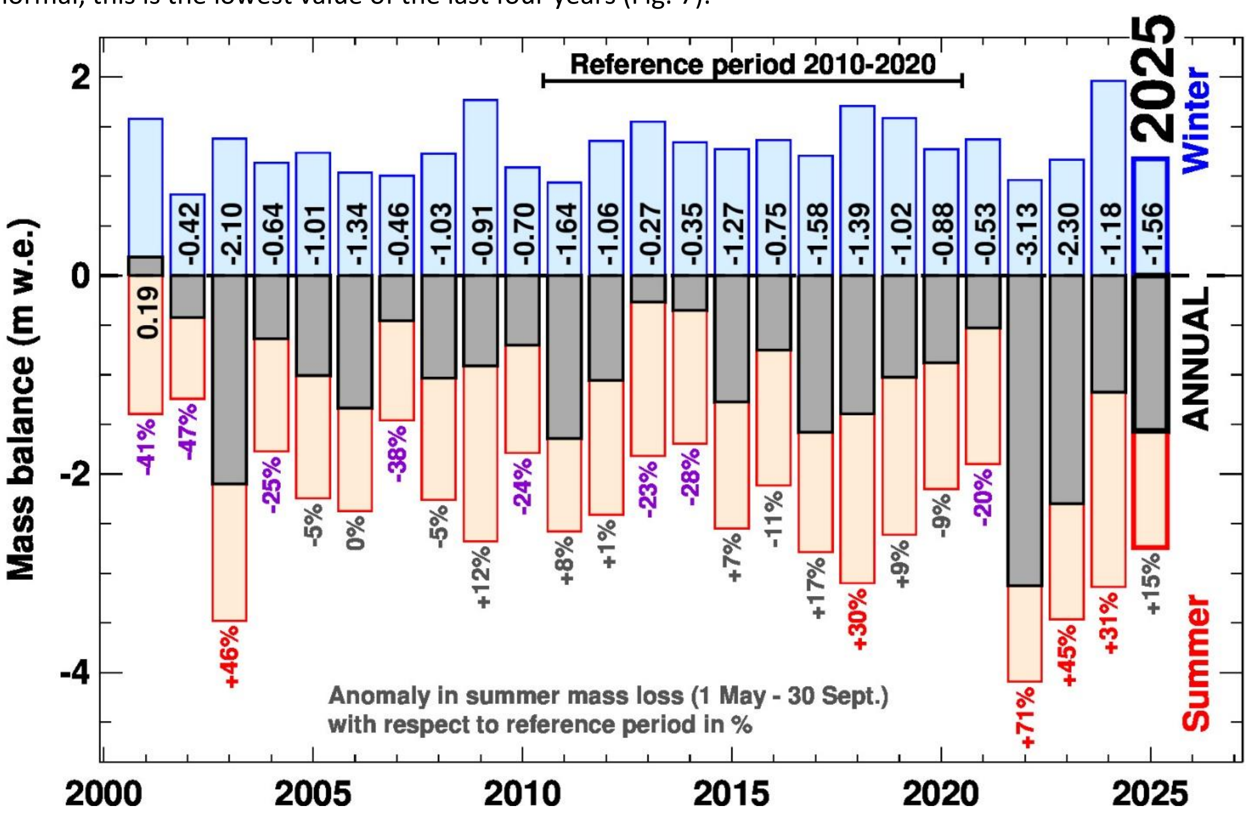


Figure 7: Seasonal mass balance extrapolated to all glaciers in Switzerland. Annual mass balance (1 Oct. - 30 Sept., dark grey / numbers), winter mass balance (1 Oct. - 30 April, light blue), and summer mass balance (1 May - 30 Sept., light red) is shown. Percentage numbers below the bars indicate the relative anomaly of summer mass balance relative to the period 2010-2020, coded with colours for years with strongly below-average melt (purple), average melt (grey) and strongly above-average melt (red).

When relating the annual mass balance 2024/2025 to the statistical distribution of previous measurements (Appendix A.4), the results indicate that this year is among the 20% most negative values for most glaciers, while for some glaciers exceptionally negative mass balances have been reached

(Clariden, Plainemorte, Silvretta, Tsanfleuron), sometimes only overshadowed by the record year 2022. Seasonal mass balances at the level of individual monitoring sites (Appendix A.5) provide insights into the local anomalies in winter accumulation and summer melting. The pattern of moderately to strongly below-average winter mass balance and summer mass balances only slightly more negative than the average is visible at all sites.

Considering mass balances at the scale of all Swiss glaciers for individual months and their spread since the beginning of the available observational time series, it becomes clear that the hydrological year 2024/2025 was exceptional during several periods of the year (Fig. 8). Whereas glacier mass balance in October 2024 was strongly positive, especially when compared to the result of the previous year, February and March were characterized by substantially below-average snow accumulation. The month of June 2025 stands out as – together with 2003 – the lowest glacier mass balance ever recorded in that month. Even though July was perceived as a cool and rainy month, glacier mass balance almost matches the average with respect to the full time series 1950-2025 (Fig. 8). Glacier mass balance in August was low but was far from reaching the record value of the year 2024 for that month.

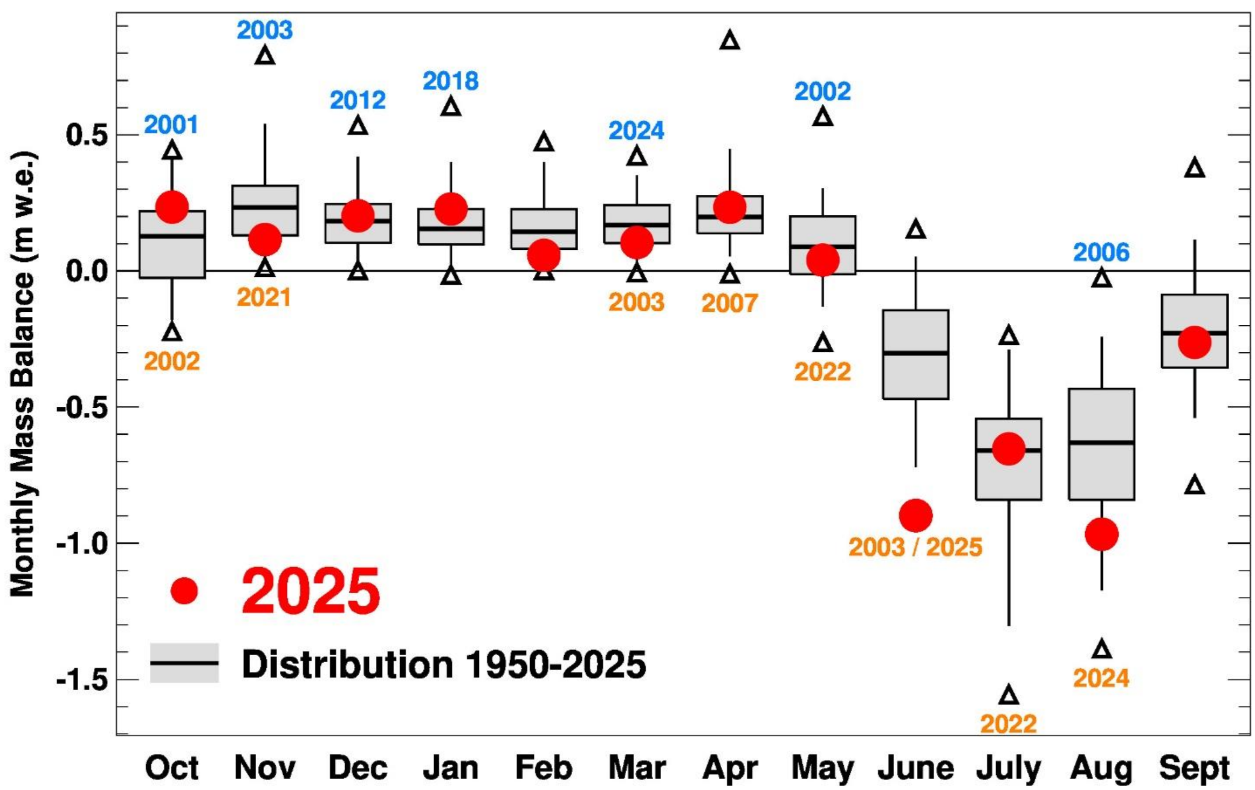


Figure 8: Spread in monthly glacier mass balance during 1950-2025. The results are based on a combination of direct measurements during this period and modelling. Boxes contain 50%, and bars 90 % of the data, while the maximum and minimum value is marked with triangles. The years of monthly record values (maximum/minimum) in the 21st century are spelled out in light blue/orange.

By combining the extrapolated glacier mass change with a complete assessment of the glacier volume in Switzerland (Grab et al., 2021), ice volume series can be prolonged up to today at the scale of individual glaciers, hydrological catchments and the whole of Switzerland. The results indicate that Switzerland still hosts ca. **45.1 km^3 of glacier ice** by the end of 2025 (Fig. 7). This is 30 km^3 less than in the year 2000. At present, Swiss glacier area is estimated to be 755 km^2, corresponding to a decline of 30% relative to 2000.

The annual reduction of Swiss-wide glacier volume relative to the remaining volume mostly fluctuated between ca.–0.5% and –2.5% per year during the last two decades. The two extreme years 2022 (–5.9%) and 2023 (–4.4%) have completely changed the scene with unprecedented ice volume losses. Even though the year 2025 exhibits a less impressive **ice volume reduction by –3.0%** it still ranks fourth in terms of relative loss since the beginning of the detailed glaciological observations in the 1950s (Fig. 9). In this consideration, we exclude slightly higher relative ice volume losses in 1921, 1928 and 1947 included in the data set of long-term Swiss-wide glacier mass change (van Tiel et al., 2025) as the spatial coverage of measurements throughout the Swiss Alps was very limited at that time.

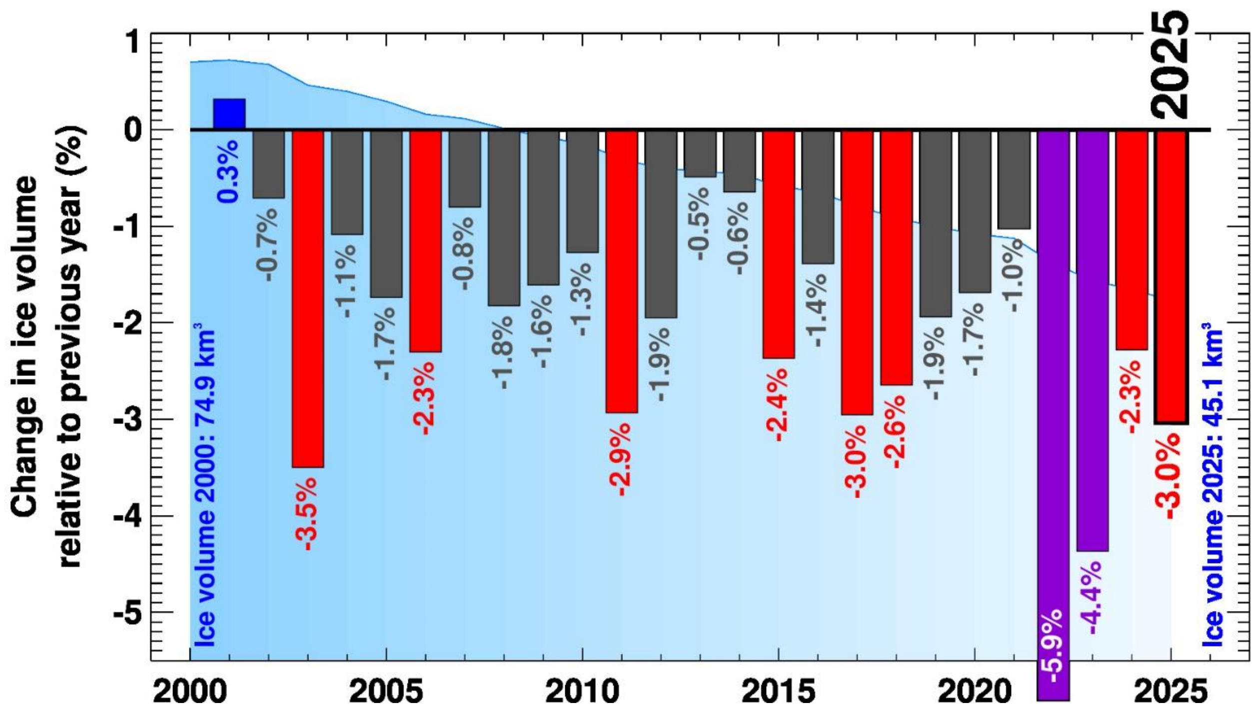


Figure 9: Swiss-wide annual change in glacier volume relative to the remaining ice volume of the previous year. Colours visualize moderate (dark grey), strong (red) and extreme losses (purple). 2025 is highlighted. The blue surface in the background visualizes the temporal evolution of total ice volume.

When considering glacier volume changes over 10-year periods, the present decade sticks out with the by far most important relative ice volume loss. The acceleration trend in the 21st century is striking: While 10% of the Swiss ice volume disappeared in the decade leading up to the year 2000, it was 14% in 2000-2010, 17% in 2010-2020 and **24% over the last decade (2015-2025)**.

While the relative ice volume losses showed very high values in 2022, 2023 and 2025 (Fig. 9), absolute volume changes indicate that the peak melt water release from Swiss glaciers has likely been passed with the recent extreme years (Fig. 10). With a **total ice volume loss of –1.4 km^3**, the year 2025 is only average with respect to the last decades. This is explained by the rapid decline in glacier area due to the recent major reduction in ice volume. Even with intense melt rates per unit area (Fig. 7), and large relative losses compared to the remaining ice volume (Fig. 9), glaciers can no longer provide very high quantities of melt water to downstream areas. This declining trend, despite increasing temperatures and snow/ice melt, is expected to pose important challenges for the future management of water resources (irrigation, hydropower production, ecology, transportation), especially during drought periods (van Tiel et al., 2025).

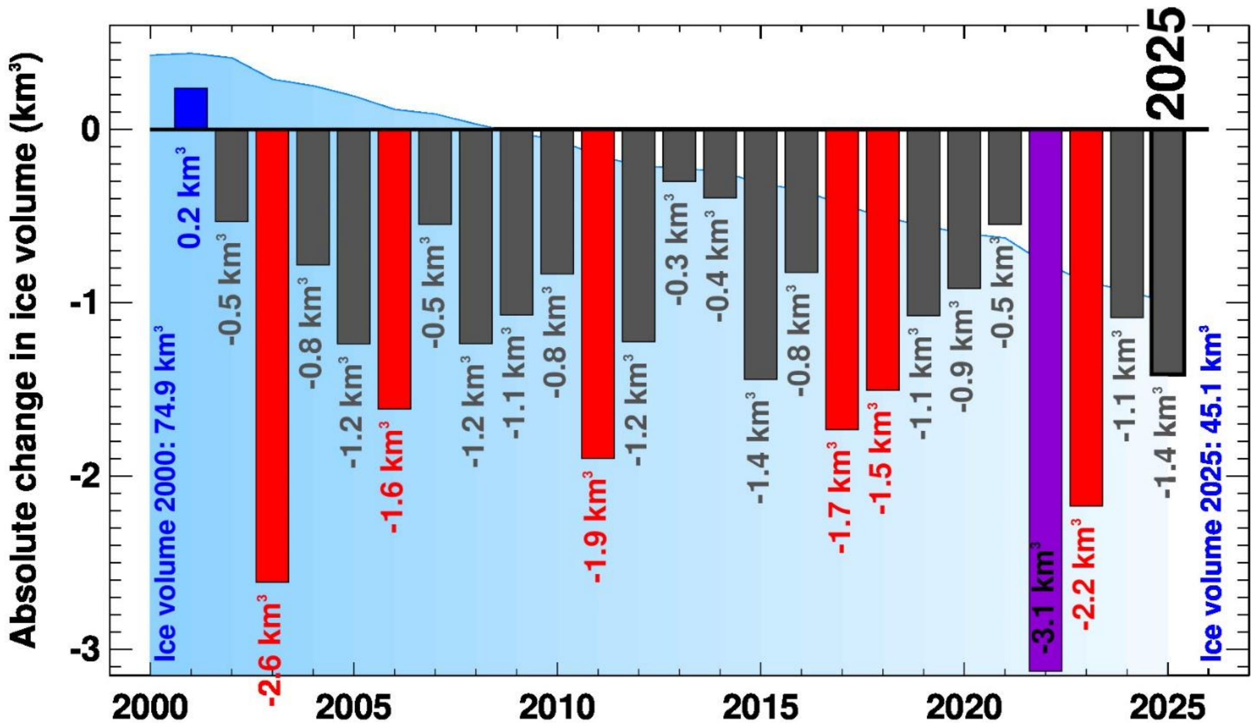


Figure 10: Swiss-wide annual change in absolute glacier ice volume. Colours visualize moderate (dark grey), strong (red) and extreme losses (purple). 2025 is highlighted.

An aspect of glacier change that has become increasingly important during the last years is the disappearance of small glaciers and the disintegration of glacier tongues. Recent years with extreme melting are boosting these processes that cause feedback effects further accelerating local landscape changes. Between 1973 and 2016, more than 1’000 Swiss glaciers completely vanished (Linsbauer et al., submitted). Additionally, about 100 glaciers have disappeared only between 2016 and 2022 (GLAMOS, 2024b). Furthermore, processes of internal decay are increasingly observed on glaciers (Hösli et al., 2025): Due to stagnation of the ice flow, cavities beneath the ice – carved by water and warm air – may grow over several years and then collapse. This results in deep craters that disrupt the glacier tongues and further accelerate retreat rates.

Disappearance of Pizolgletscher between 2006 and 2025. (Photos: M. Huss)

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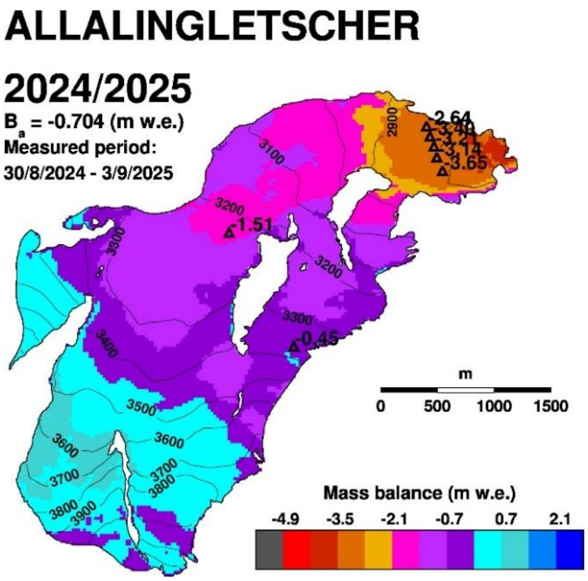
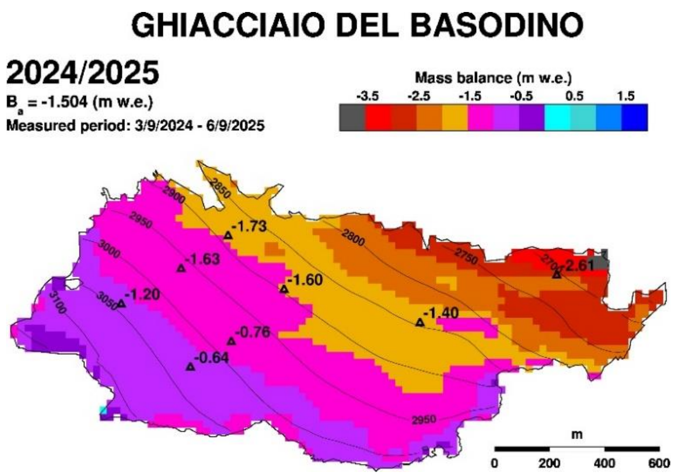
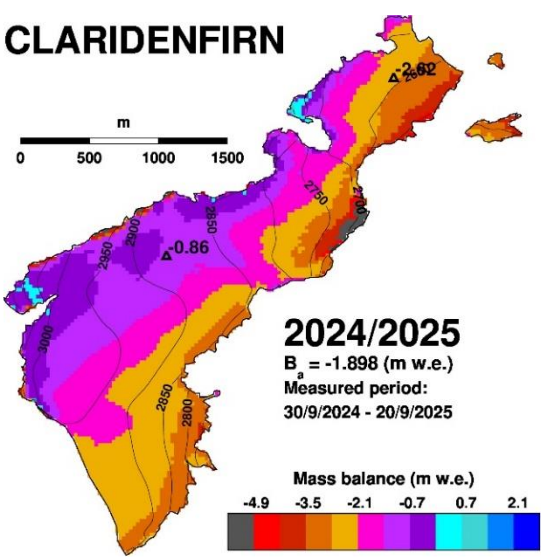
3. Appendix

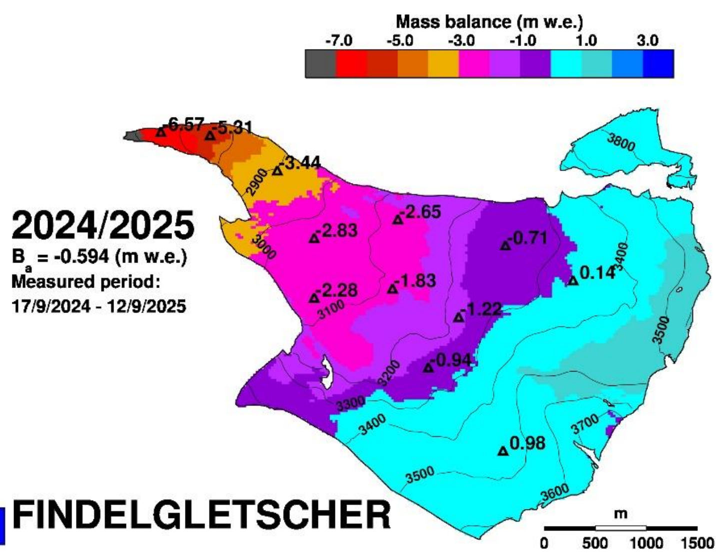
A.1 Spatial distribution of annual mass balance

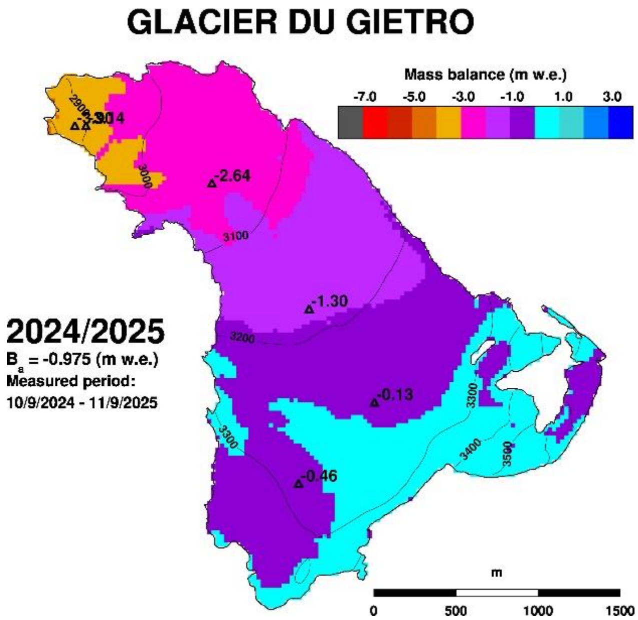
The figures below show the extrapolated annual mass balance distribution in metres water equivalent (m w.e.) during the measurement period (dates are given). Point surface mass balance measurements are indicated with black triangles, and the observed value for the respective period is stated. The spatial extrapolation accounts temperature and precipitation gradients, as well as for processes of local snow redistribution and topographic enhancement of solar radiation. Note that the scale of the maps and the range of displayed mass balances differ between the glaciers.



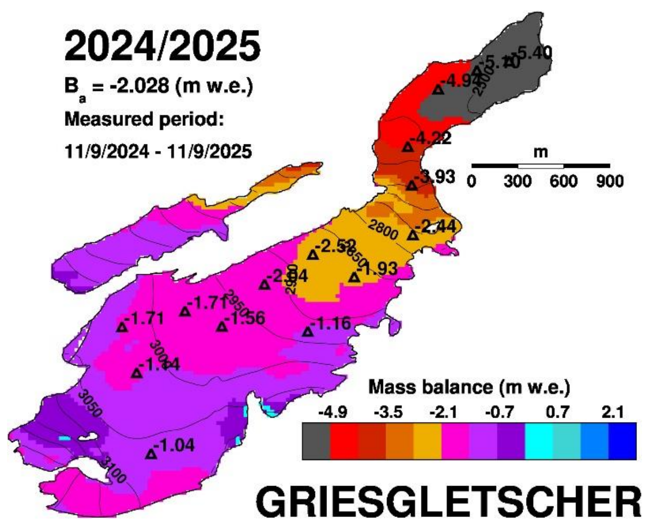


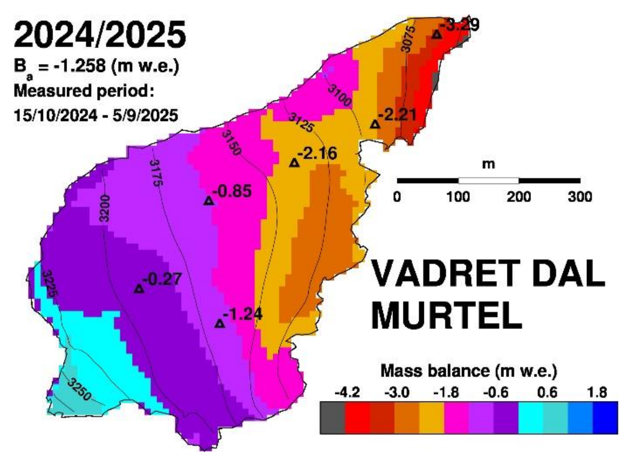


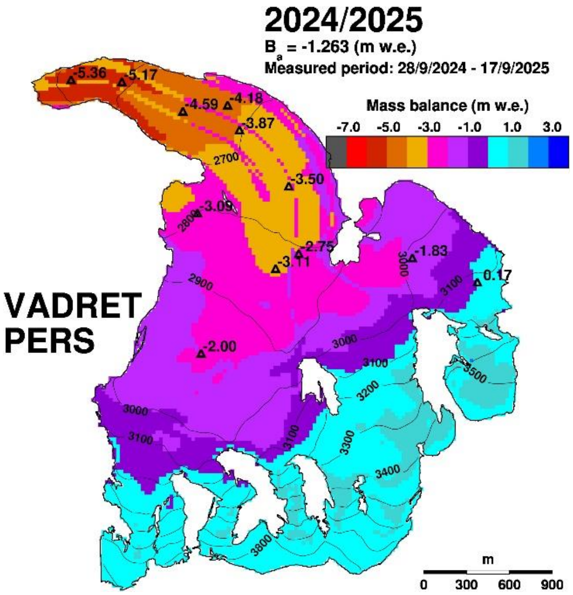


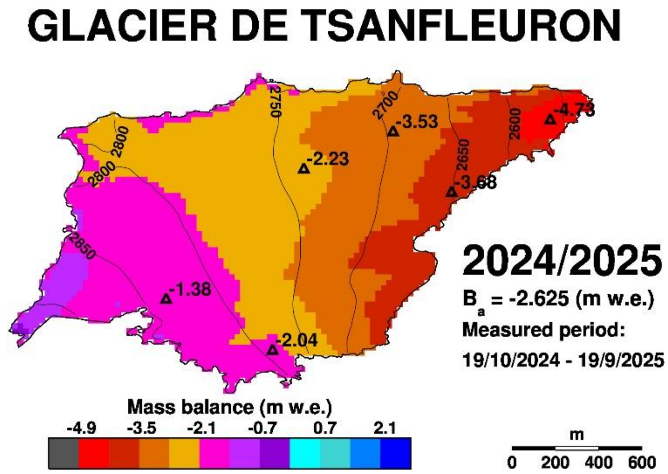

GLACIER DU GIETRO
Mass balance (m w.e.)
-7.0 -5.0 -3.0 -1.0 1.0 3.0
2024/2025
B$_a$ = -0.975 (m w.e.)
Measured period:
10/9/2024 - 11/9/2025
-2.64
-1.30
-0.13
-0.46
m
0 500 1000 1500

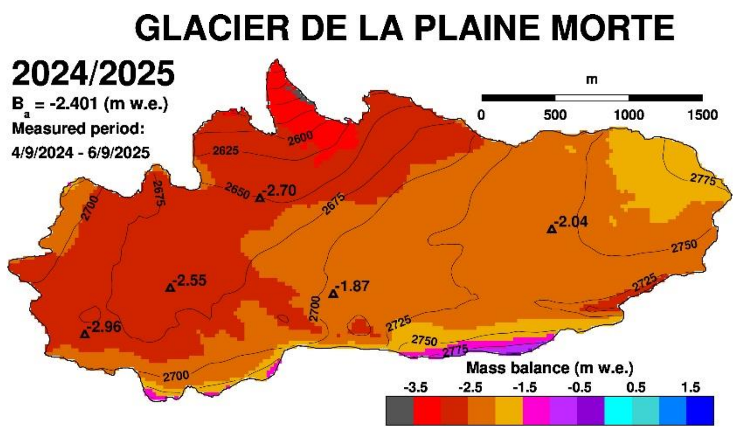

km
0 1 2 3
1.27
-0.16
-2.27
-3.11
-4.11
-5.61
-5.39
-7.14
-10.80
GROSSER
ALETSCHGLETSCHER
2024/2025
B$_a$ = -1.445 (m w.e.)
Measured period: 19/9/2024 - 15/9/2025
Mass balance (m w.e.)
-10.5 -7.5 -4.5 -1.5 1.5 4.5

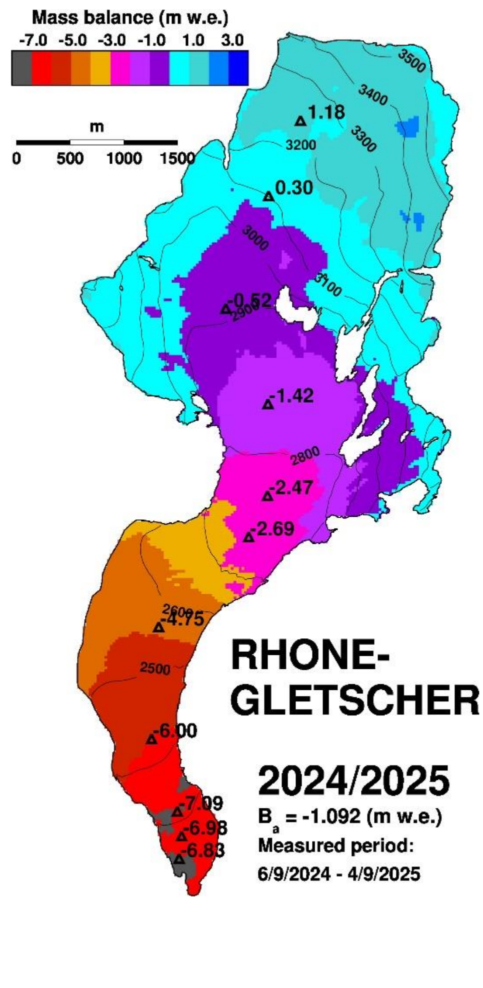

2024/2025
B$_a$ = -2.028 (m w.e.)
Measured period:
11/9/2024 - 11/9/2025
-4.22
-3.93
-2.44
-1.93
-1.71
-1.71
-1.56
-1.16
-1.04
m
0 300 600 900
Mass balance (m w.e.)
-4.9 -3.5 -2.1 -0.7 0.7 2.1
GRIESGLETSCHER

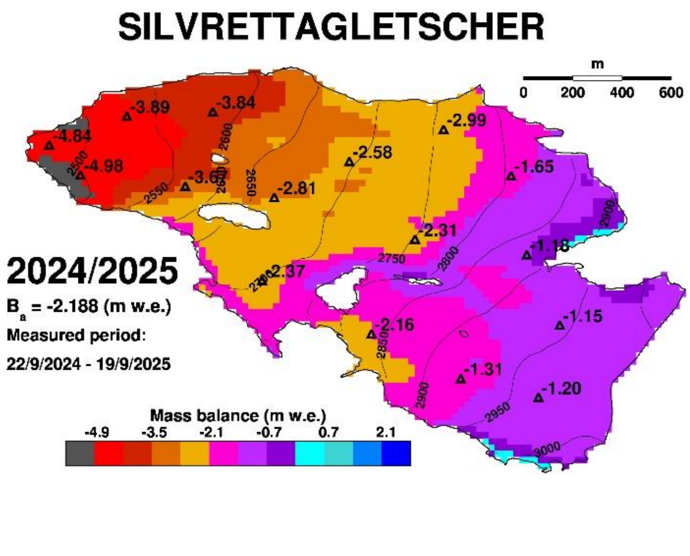

2024/2025
B$_a$ = -1.258 (m w.e.)
Measured period:
15/10/2024 - 5/9/2025
-3.29
-2.21
-2.16
-0.85
-0.27
-1.24
m
0 100 200 300
VADRET DAL
MURTEL
Mass balance (m w.e.)
-4.2 -3.0 -1.8 -0.6 0.6 1.8


2024/2025
B_a = -1.263 (m w.e.)
Measured period: 28/9/2024 - 17/9/2025
Mass balance (m w.e.)
-7.0 -5.0 -3.0 -1.0 1.0 3.0
VADRET PERS
-5.36
-5.17
-4.59
-4.18
-3.87
-3.50
-3.09
-2.75
-3.11
-1.83
0.17
-2.00
m
0 300 600 900


GLACIER DE TSANFLEURON
-4.73
-3.53
-2.23
-3.68
-1.38
-2.04
2024/2025
B_a = -2.625 (m w.e.)
Measured period:
19/10/2024 - 19/9/2025
Mass balance (m w.e.)
-4.9 -3.5 -2.1 -0.7 0.7 2.1
m
0 200 400 600

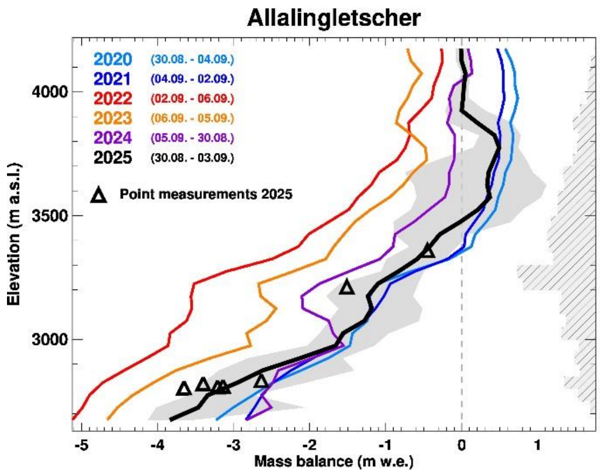

GLACIER DE LA PLAINE MORTE
2024/2025
B_a = -2.401 (m w.e.)
Measured period:
4/9/2024 - 6/9/2025
m
0 500 1000 1500
-2.70
-2.04
-2.55
-1.87
-2.96
Mass balance (m w.e.)
-3.5 -2.5 -1.5 -0.5 0.5 1.5

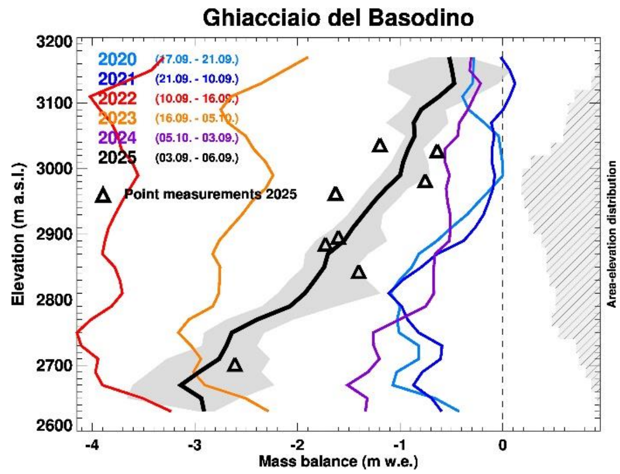

Mass balance (m w.e.)
-7.0 -5.0 -3.0 -1.0 1.0 3.0
m
0 500 1000 1500
1.18
0.30
-0.52
-1.42
-2.47
-2.69
-4.75
-6.00
-7.09
-6.98
-6.83
RHONE-
GLETSCHER
2024/2025
B_a = -1.092 (m w.e.)
Measured period:
6/9/2024 - 4/9/2025

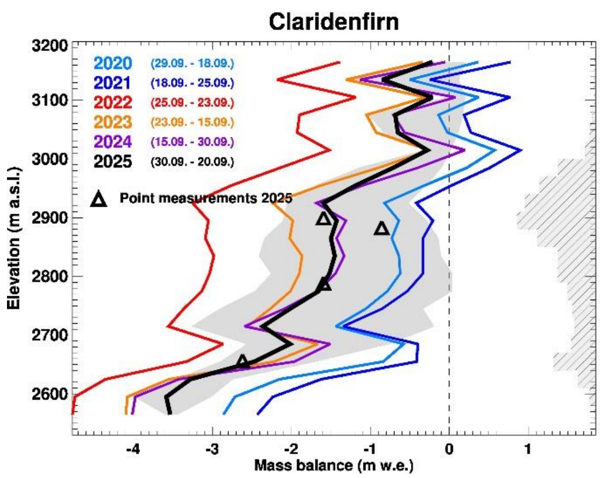

SILVRETTAGLETSCHER
m
0 200 400 600
-3.89
-3.84
-4.84
-4.98
-2.99
-2.58
-1.65
-2.81
-2.31
-1.18
-2.37
-2.16
-1.15
-1.31
-1.20
2024/2025
B_a = -2.188 (m w.e.)
Measured period:
22/9/2024 - 19/9/2025
Mass balance (m w.e.)
-4.9 -3.5 -2.1 -0.7 0.7 2.1

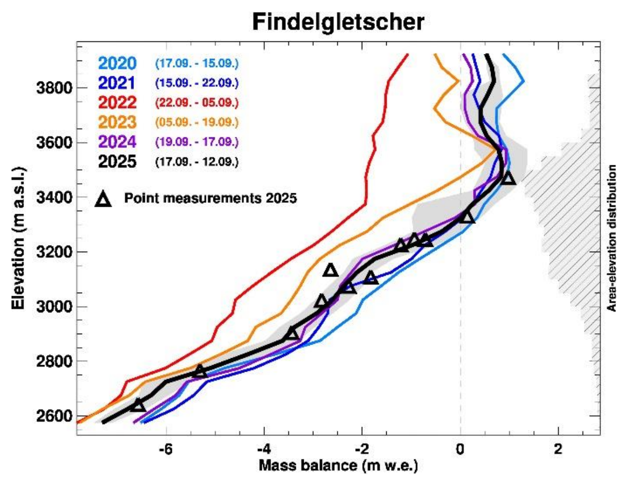
A.2 Elevation distribution of observed annual mass balance 2019-2025

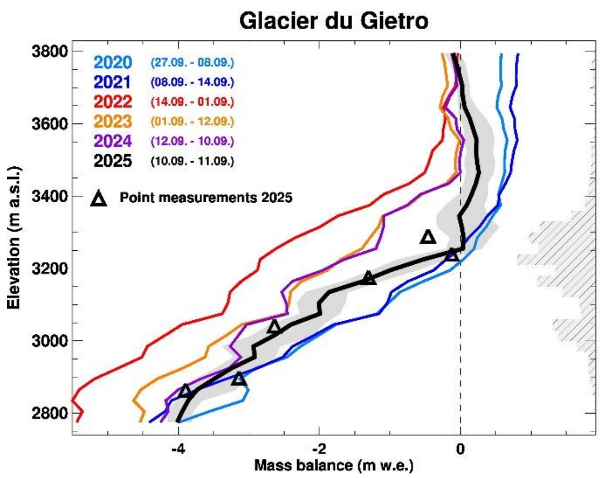
The figures below show the elevation distribution of annual mass balance during measurement period (respective dates are stated) extrapolated to the entire glacier surface over the last six years (2019-2025). The grey band shows the spread of mass balance per elevation band for the year 2025. Observed local mass balance is shown with triangles. Note that the x-axis scale differs between the graphs. The glaciers are alphabetically ordered.

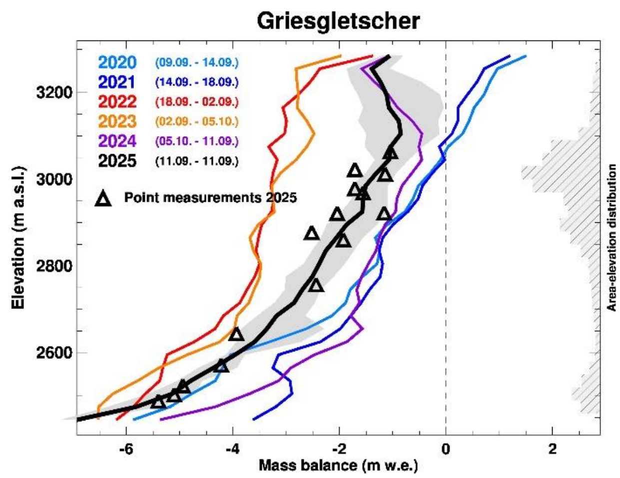


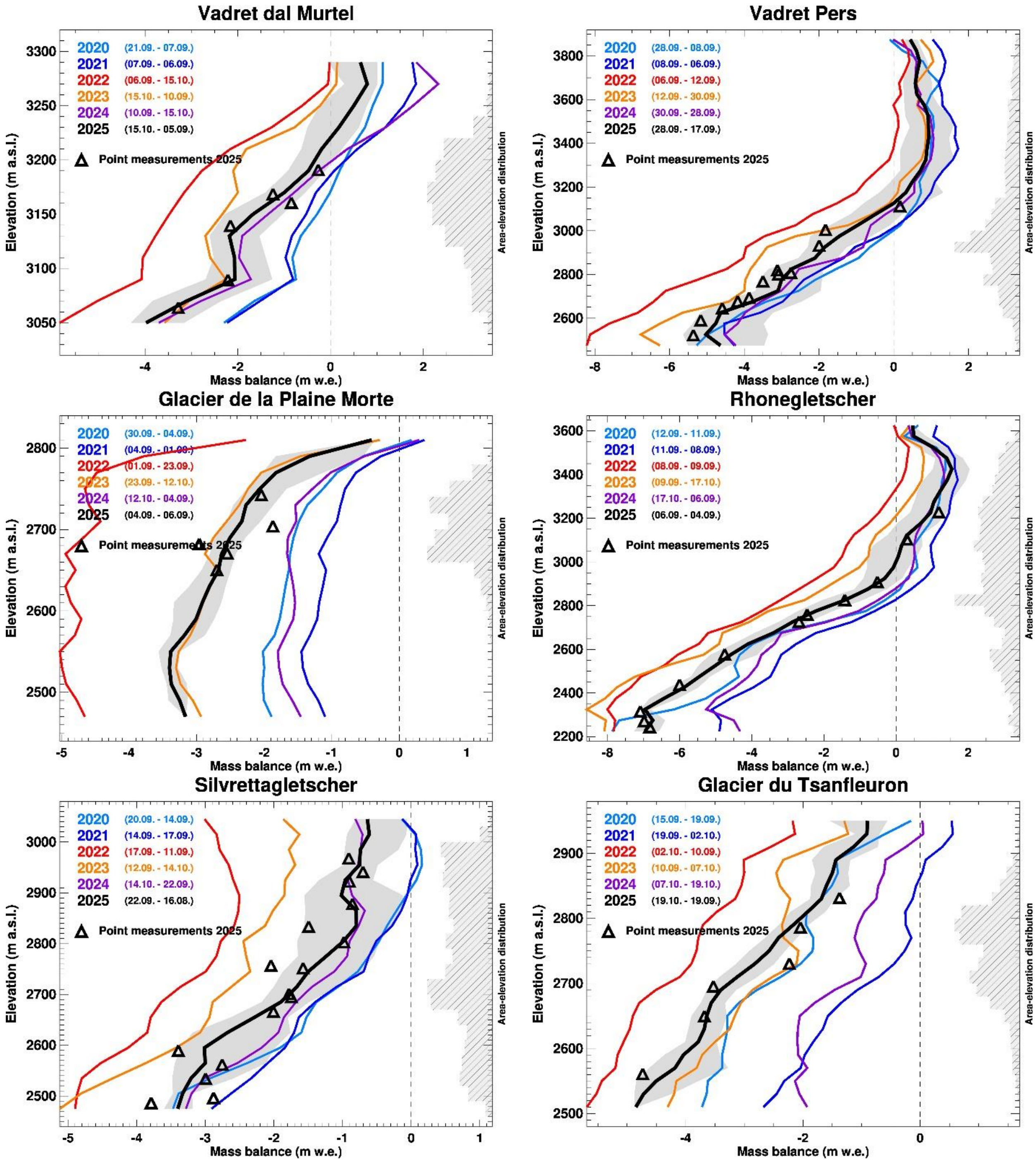






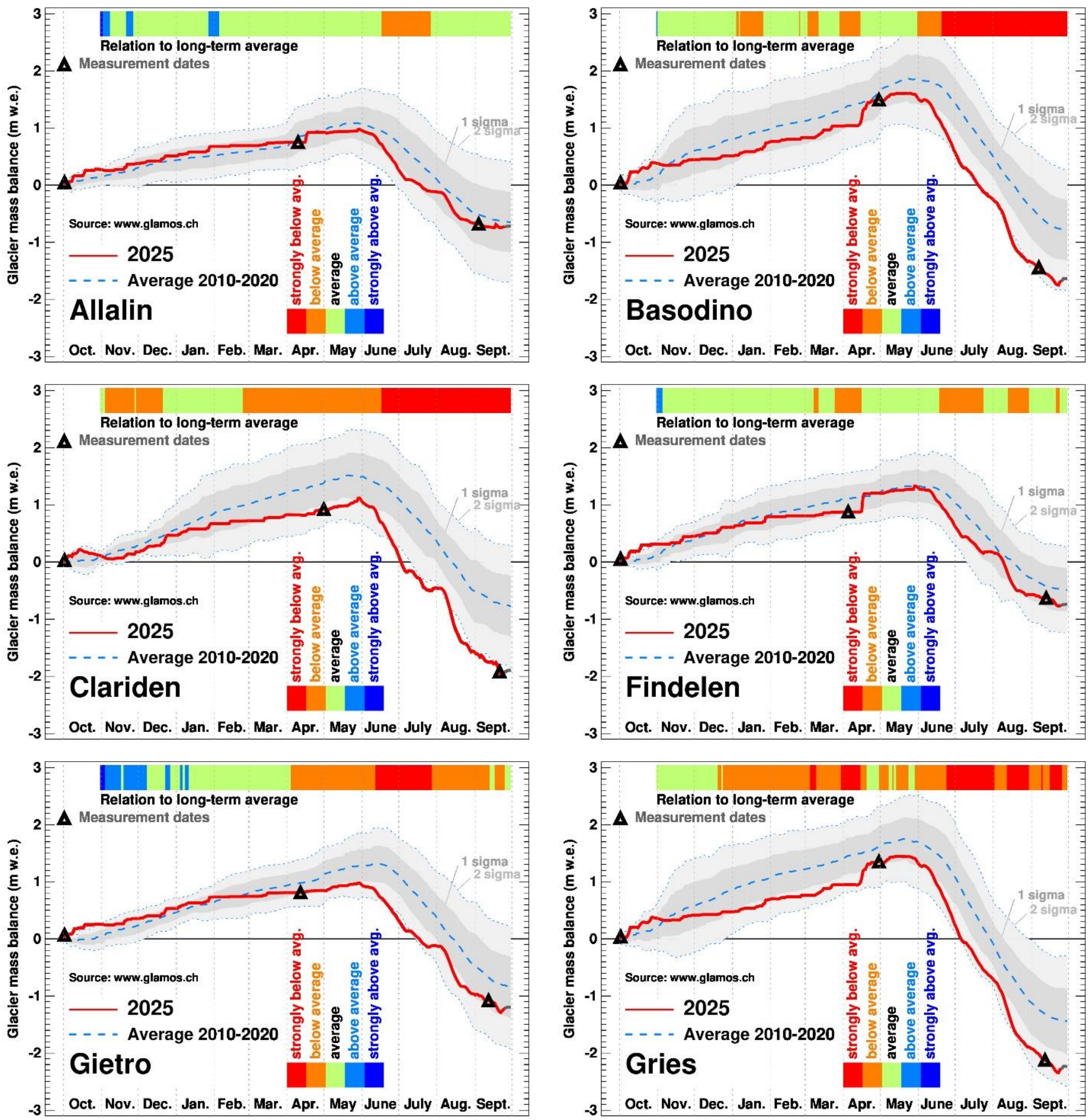


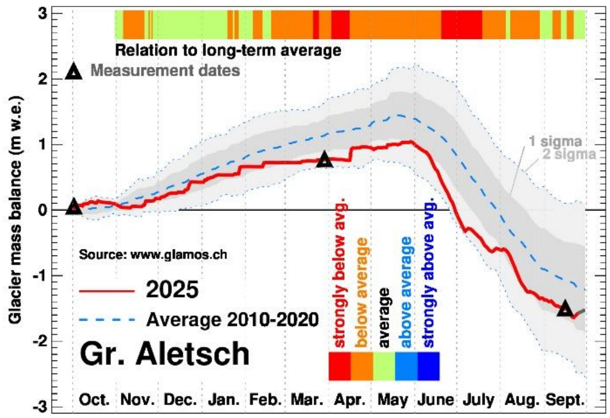


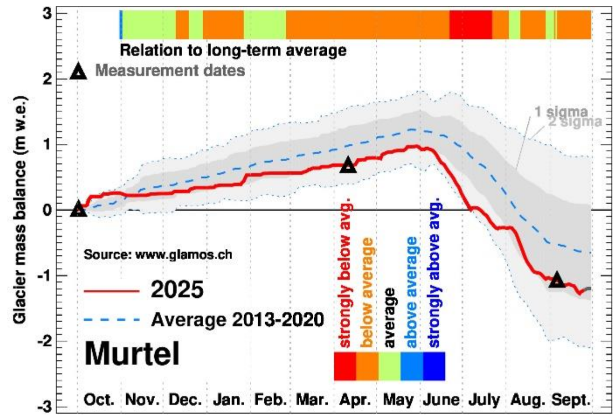

Vadret dal Murtel
2020 (21.09. - 07.09.)
2021 (07.09. - 06.09.)
2022 (06.09. - 15.10.)
2023 (15.10. - 10.09.)
2024 (10.09. - 15.10.)
2025 (15.10. - 05.09.)
Point measurements 2025
Elevation (m a.s.l.)
Mass balance (m w.e.)
Area-elevation distribution
Vadret Pers
2020 (28.09. - 08.09.)
2021 (08.09. - 06.09.)
2022 (06.09. - 12.09.)
2023 (12.09. - 30.09.)
2024 (30.09. - 28.09.)
2025 (28.09. - 17.09.)
Point measurements 2025
Glacier de la Plaine Morte
2020 (30.09. - 04.09.)
2021 (04.09. - 01.09.)
2022 (01.09. - 23.09.)
2023 (23.09. - 12.10.)
2024 (12.10. - 04.09.)
2025 (04.09. - 06.09.)
Point measurements 2025
Rhonegletscher
2020 (12.09. - 11.09.)
2021 (11.09. - 08.09.)
2022 (08.09. - 09.09.)
2023 (09.09. - 17.10.)
2024 (17.10. - 06.09.)
2025 (06.09. - 04.09.)
Point measurements 2025
Silvrettagletscher
2020 (20.09. - 14.09.)
2021 (14.09. - 17.09.)
2022 (17.09. - 11.09.)
2023 (12.09. - 14.10.)
2024 (14.10. - 22.09.)
2025 (22.09. - 16.08.)
Point measurements 2025
Glacier du Tsanfleuron
2020 (15.09. - 19.09.)
2021 (19.09. - 02.10.)
2022 (02.10. - 10.09.)
2023 (10.09. - 07.10.)
2024 (07.10. - 19.10.)
2025 (19.10. - 19.09.)
Point measurements 2025

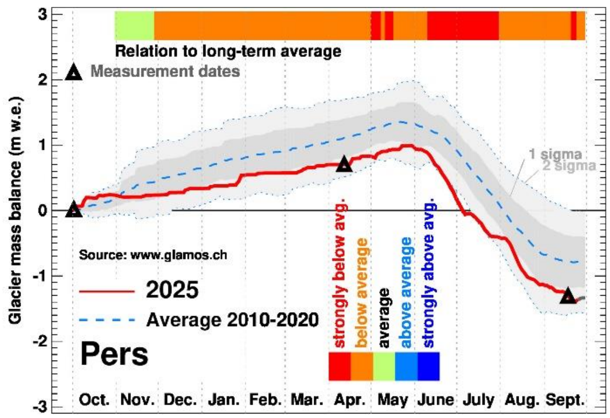
A.3 Temporal evolution of mass balance during the hydrological year 2024/2025

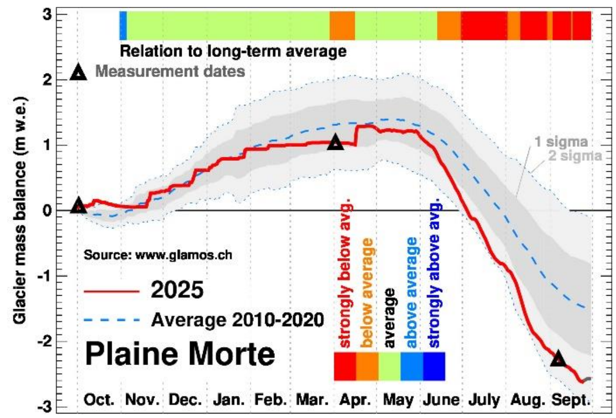
The figures below show the modelled daily cumulative mass balance during the hydrological year 2024/2025 in comparison to the average and the spread of the years 2010-2020. The measurement dates in late winter and late summer, by which the daily cumulative glacier-wide mass balance is constrained, is shown with black triangles. The top bar indicates periods throughout the year with below- or above-average mass balance. The glaciers are alphabetically ordered.

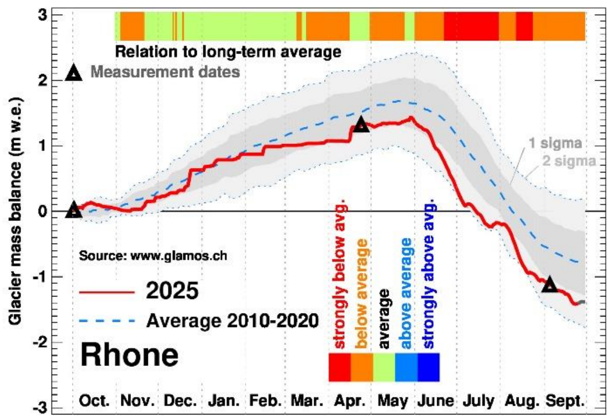


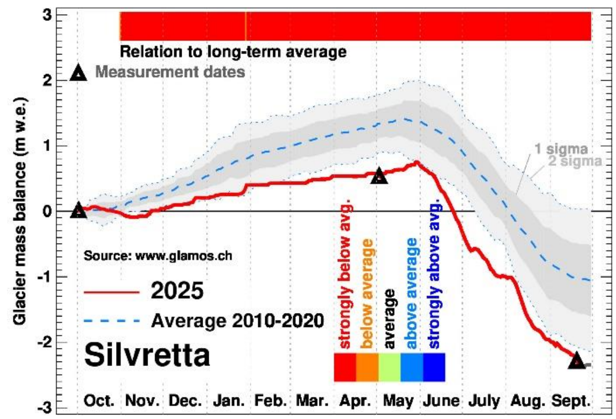

Relation to long-term average
Measurement dates
Glacier mass balance (m w.e.)
1 sigma
2 sigma
Source: www.glamos.ch
2025
Average 2010-2020
Gr. Aletsch
strongly below avg.
below average
average
above average
strongly above avg.
Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept.

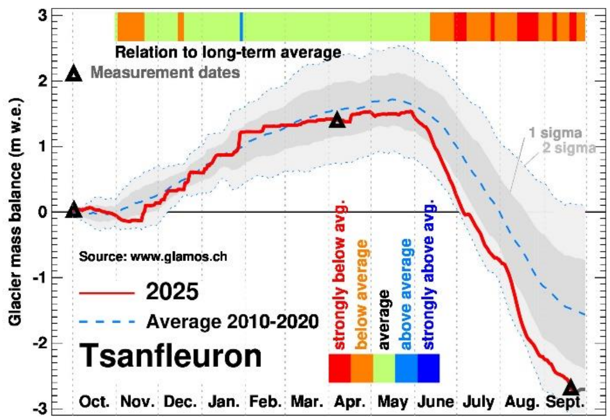

Relation to long-term average
Measurement dates
Glacier mass balance (m w.e.)
1 sigma
2 sigma
Source: www.glamos.ch
2025
Average 2013-2020
Murtel
strongly below avg.
below average
average
above average
strongly above avg.
Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept.


Relation to long-term average
Measurement dates
Glacier mass balance (m w.e.)
1 sigma
2 sigma
Source: www.glamos.ch
2025
Average 2010-2020
Pers
strongly below avg.
below average
average
above average
strongly above avg.
Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept.


Relation to long-term average
Measurement dates
Glacier mass balance (m w.e.)
1 sigma
2 sigma
Source: www.glamos.ch
2025
Average 2010-2020
Plaine Morte
strongly below avg.
below average
average
above average
strongly above avg.
Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept.

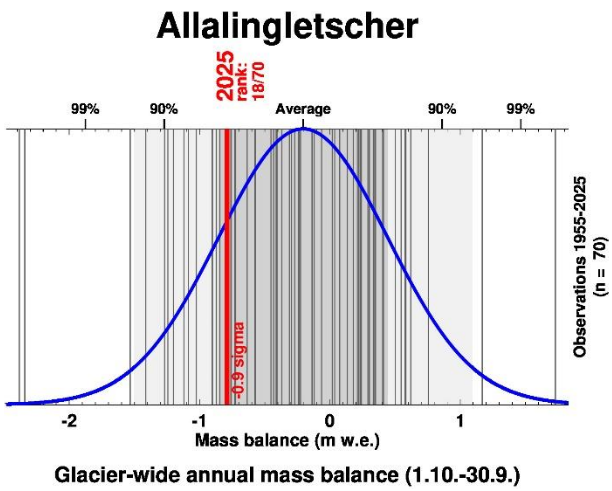

Relation to long-term average
Measurement dates
Glacier mass balance (m w.e.)
1 sigma
2 sigma
Source: www.glamos.ch
2025
Average 2010-2020
Rhone
strongly below avg.
below average
average
above average
strongly above avg.
Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept.

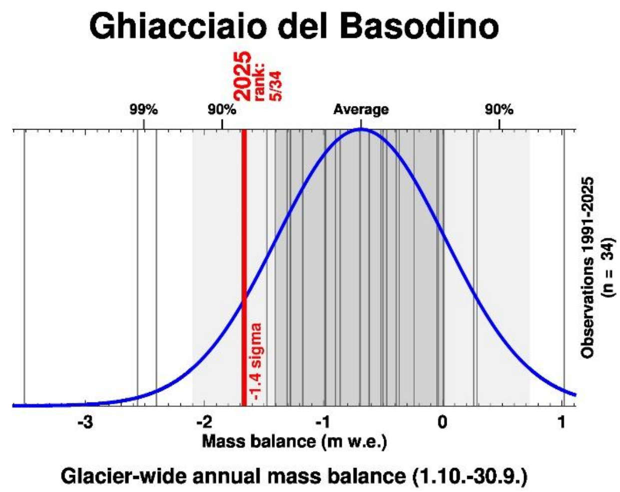

Relation to long-term average
Measurement dates
Glacier mass balance (m w.e.)
1 sigma
2 sigma
Source: www.glamos.ch
2025
Average 2010-2020
Silvretta
strongly below avg.
below average
average
above average
strongly above avg.
Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept.

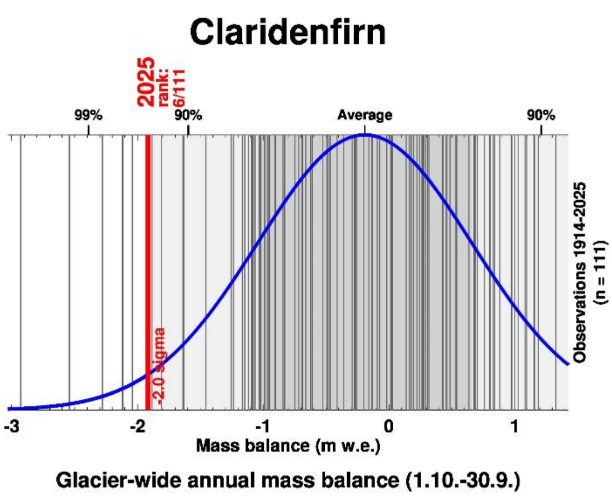

Relation to long-term average
Measurement dates
Glacier mass balance (m w.e.)
1 sigma
2 sigma
Source: www.glamos.ch
2025
Average 2010-2020
Tsanfleuron
strongly below avg.
below average
average
above average
strongly above avg.
Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept.

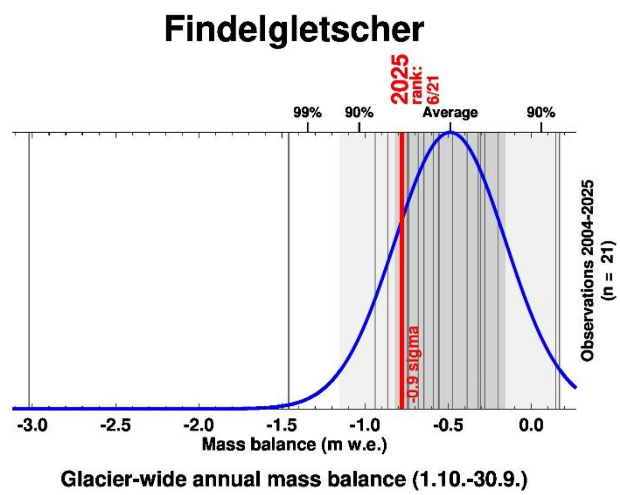
A.4 Annual mass balance 2025 compared to all years since initiation of the measurements

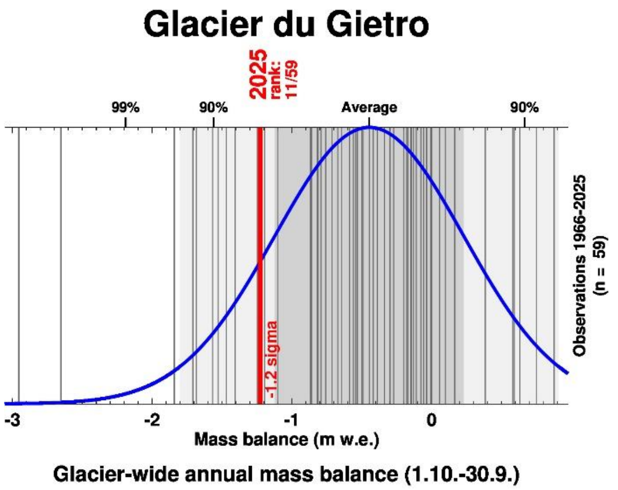
The figures below show the statistical distribution of all previously measured glacier-wide annual mass balances homogenized to the hydrological year (1 Oct - 30 Sept., vertical lines). The time period of observations is stated on the right. Ranges corresponding to 1 (dark grey) and 2 (light grey) standard deviations are shown, as are the boundaries encompassing 90% and 99% of the statistical distribution (blue line, ticks). The year 2025 is indicated with the thick, red line and the rank of 2025 starting from the most negative annual mass balance is given. Note that the x-axis scale differs between the graphs. The glaciers are alphabetically ordered.

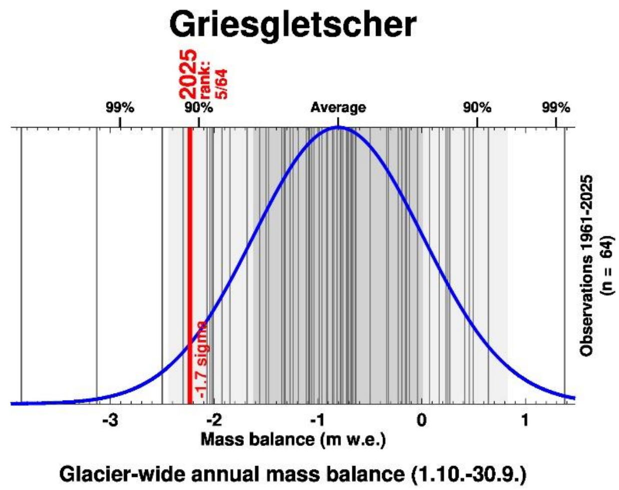


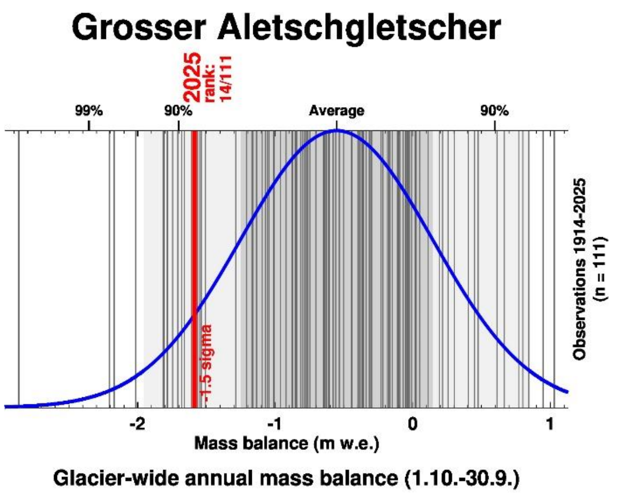


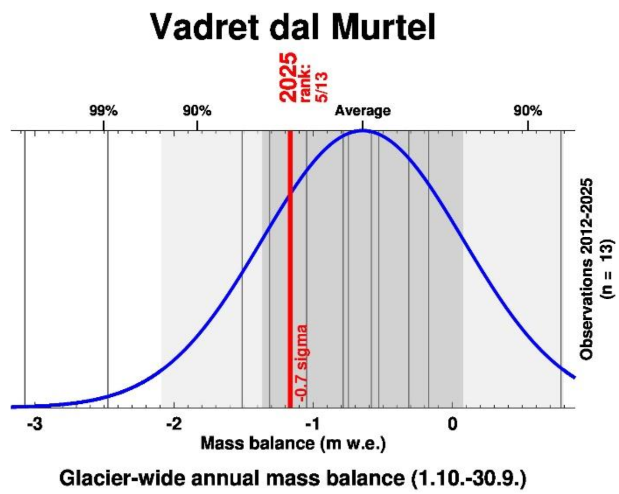


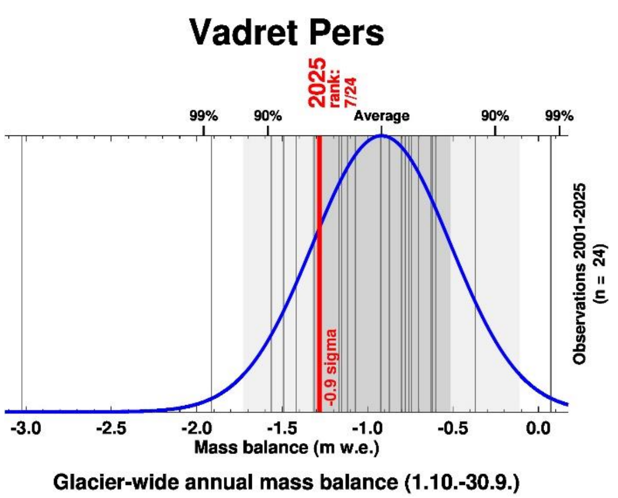


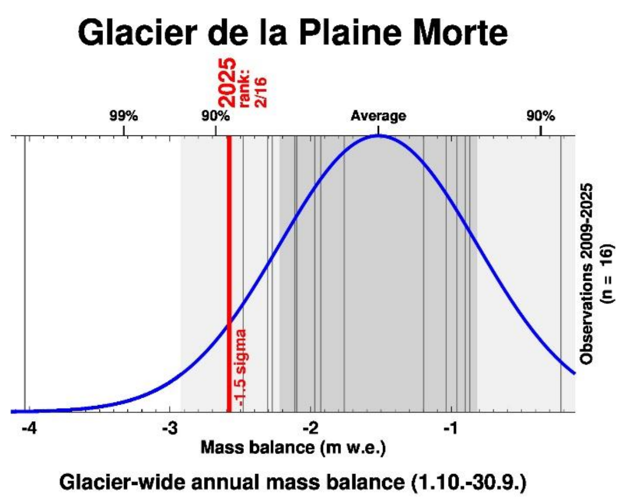

Glacier du Gietro
2025
rank:
11/59
99%
90%
Average
90%
-1.2 sigma
Observations 1966-2025
(n = 59)
-3
-2
-1
0
Mass balance (m w.e.)
Glacier-wide annual mass balance (1.10.-30.9.)

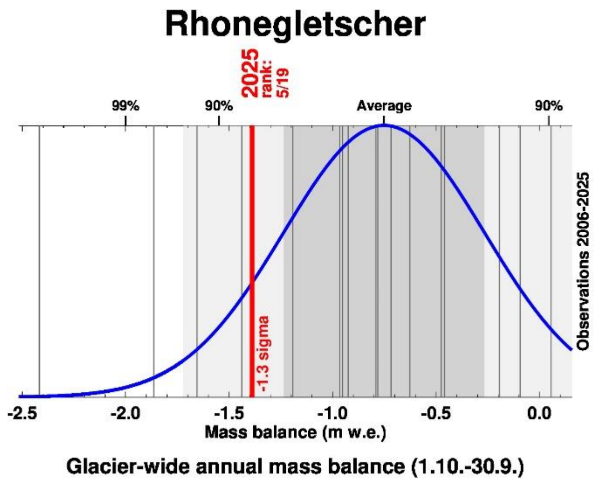

Griesgletscher
2025
rank:
5/64
99%
90%
Average
90%
99%
-1.7 sigma
Observations 1961-2025
(n = 64)
-3
-2
-1
0
1
Mass balance (m w.e.)
Glacier-wide annual mass balance (1.10.-30.9.)

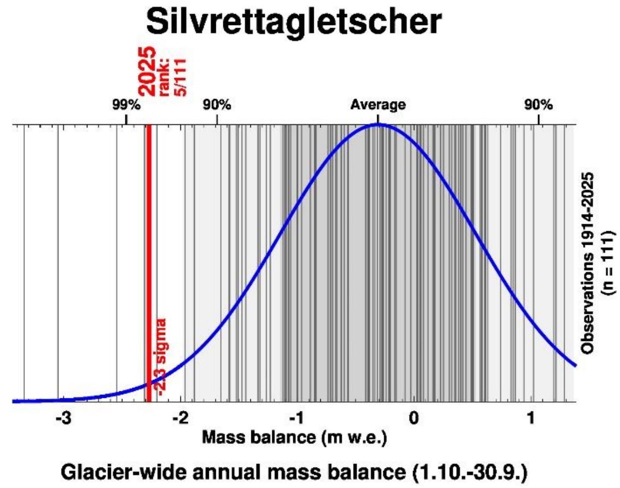

Grosser Aletschgletscher
2025
rank:
14/111
99%
90%
Average
90%
-1.5 sigma
Observations 1914-2025
(n = 111)
-2
-1
0
1
Mass balance (m w.e.)
Glacier-wide annual mass balance (1.10.-30.9.)

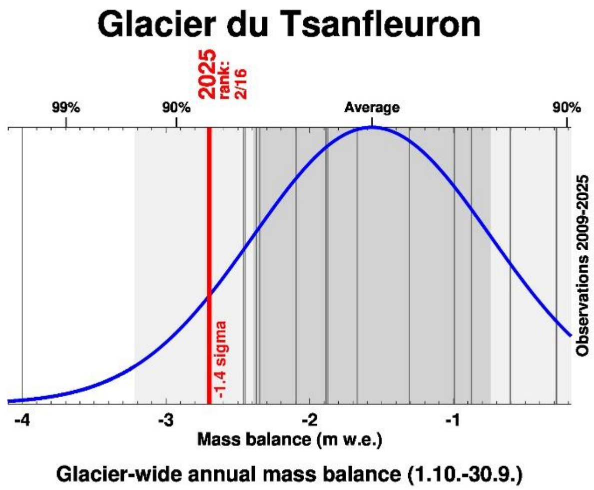

Vadret dal Murtel
2025
rank:
5/13
99%
90%
Average
90%
-0.7 sigma
Observations 2012-2025
(n = 13)
-3
-2
-1
0
Mass balance (m w.e.)
Glacier-wide annual mass balance (1.10.-30.9.)


Vadret Pers
2025
rank:
7/24
99%
90%
Average
90%
99%
-0.9 sigma
Observations 2001-2025
(n = 24)
-3.0
-2.5
-2.0
-1.5
-1.0
-0.5
0.0
Mass balance (m w.e.)
Glacier-wide annual mass balance (1.10.-30.9.)


Glacier de la Plaine Morte
2025
rank:
2/16
99%
90%
Average
90%
-1.5 sigma
Observations 2009-2025
(n = 16)
-4
-3
-2
-1
Mass balance (m w.e.)
Glacier-wide annual mass balance (1.10.-30.9.)


Rhonegletscher
2025
rank:
5/19
99%
90%
Average
90%
-1.3 sigma
Observations 2006-2025
(n = 19)
-2.5
-2.0
-1.5
-1.0
-0.5
0.0
Mass balance (m w.e.)
Glacier-wide annual mass balance (1.10.-30.9.)

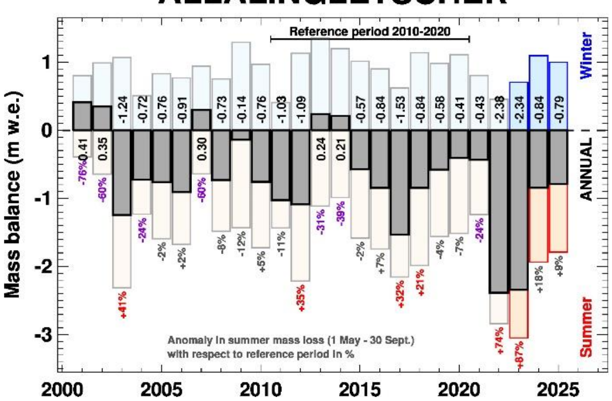

Silvrettagletscher
2025
rank:
5/111
99%
90%
Average
90%
-2.3 sigma
Observations 1914-2025
(n = 111)
-3
-2
-1
0
1
Mass balance (m w.e.)
Glacier-wide annual mass balance (1.10.-30.9.)


Glacier du Tsanfleuron
2025
rank:
2/16
99%
90%
Average
90%
-1.4 sigma
Observations 2009-2025
(n = 16)
-4
-3
-2
-1
Mass balance (m w.e.)
Glacier-wide annual mass balance (1.10.-30.9.)

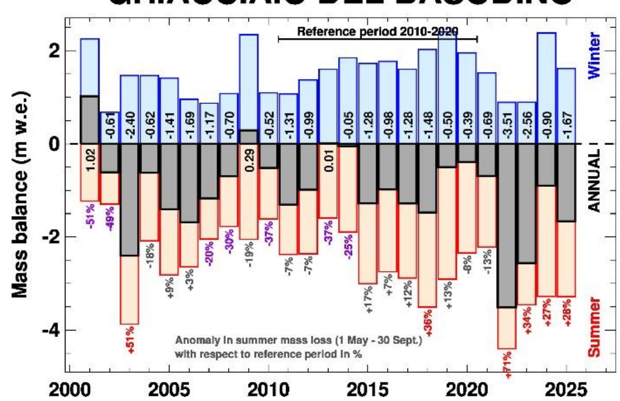
A.5 Seasonal mass balance time series (homogenized to fixed time periods)

The figures below show measured seasonal mass balance homogenized to fixed time periods for the **annual mass balance** (1 Oct. - 30 Sept., dark grey / numbers), **winter mass balance** (1 Oct. - 30 April, light blue), and **summer mass balance** (1 May – 30 Sept., light red). All years since 2000 are displayed. Light bars for a few glaciers show years where the seasonal mass balance components are not based on in situ measurements but modelling. Measurements for the annual mass balance were available throughout the entire period shown. Percentage numbers below the bars indicate the relative anomaly of summer mass balance relative to the period 2010-2020, coded with colours for years with strongly below-average melt (purple), average melt (grey) and strongly above-average melt (red). Note that the y-axis scale differs between the plots. The glaciers are alphabetically ordered.

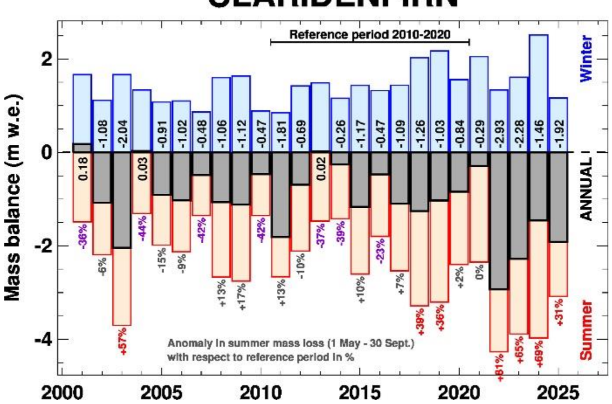
ALLALINGLETSCHER



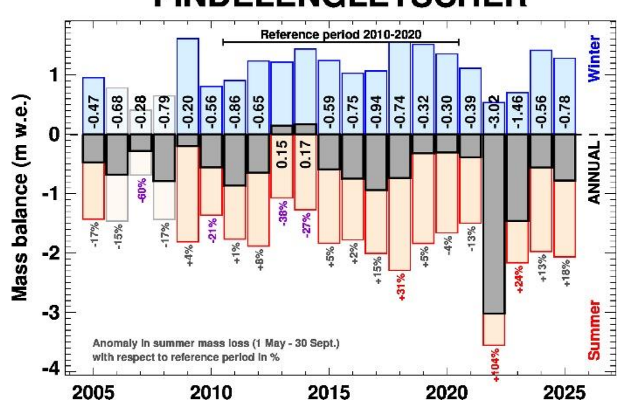
GHIACCIAIO DEL BASODINO



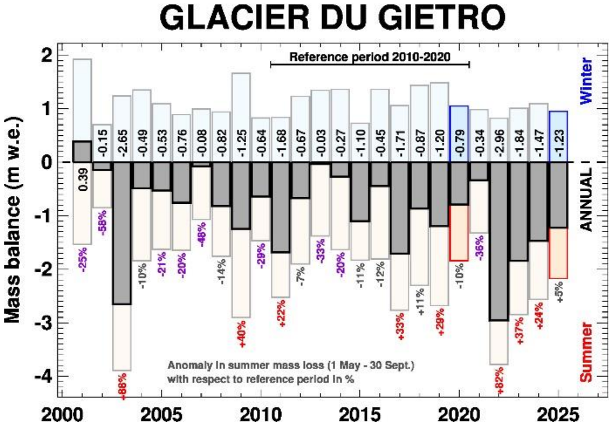
CLARIDENFIRN



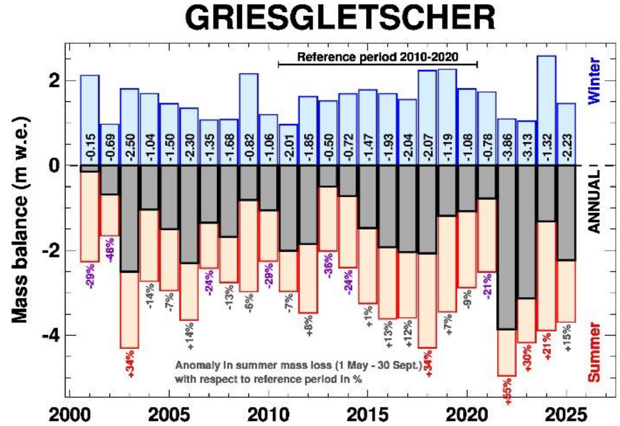
FINDELENGLETSCHER

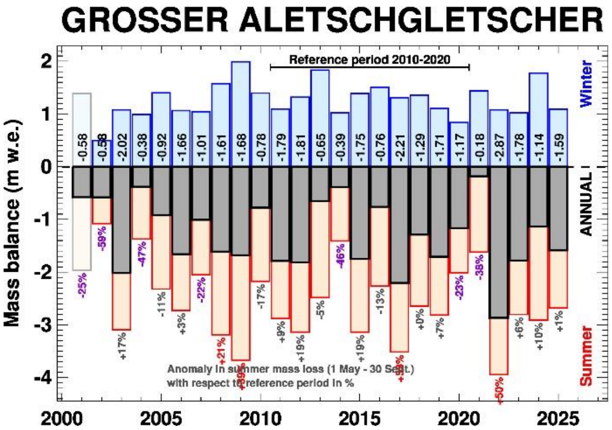


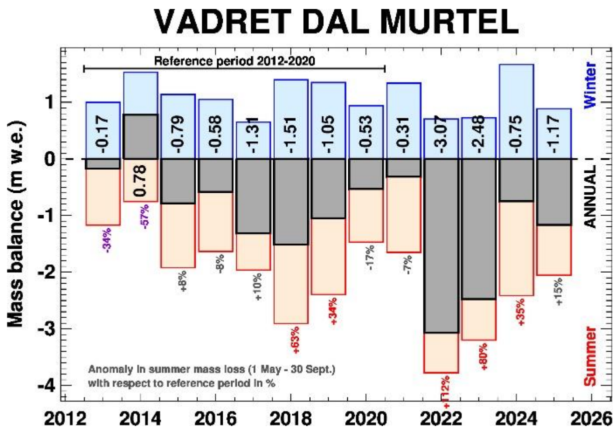
GLACIER DU GIETRO

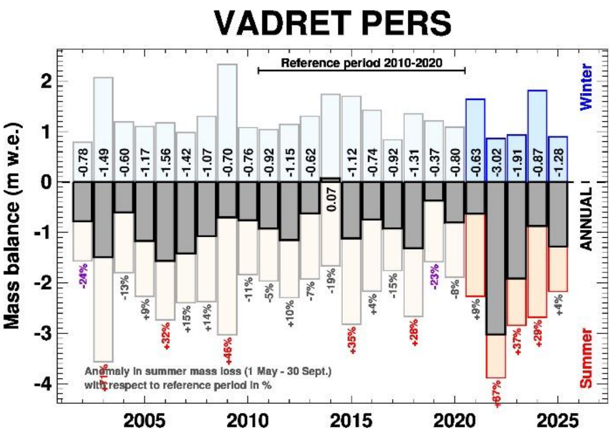


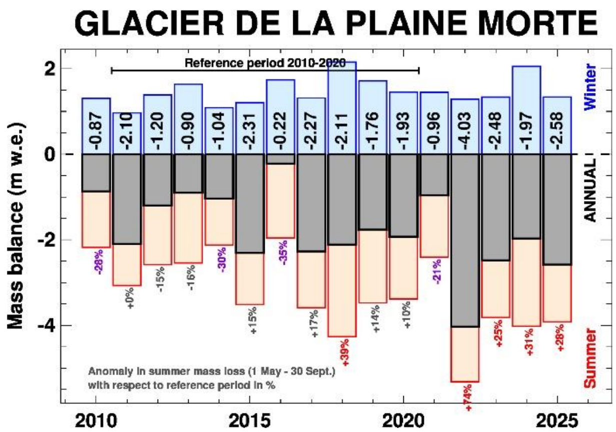
GRIESGLETSCHER

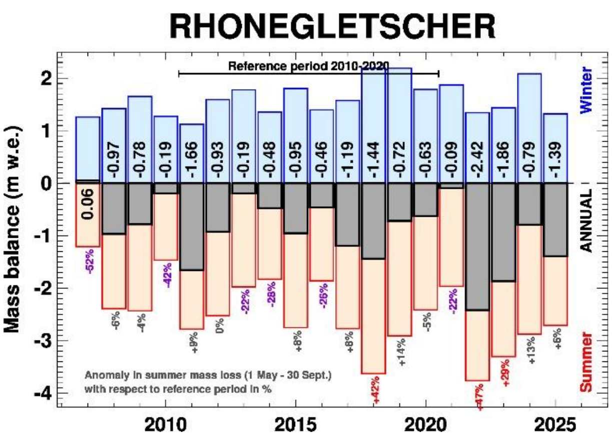


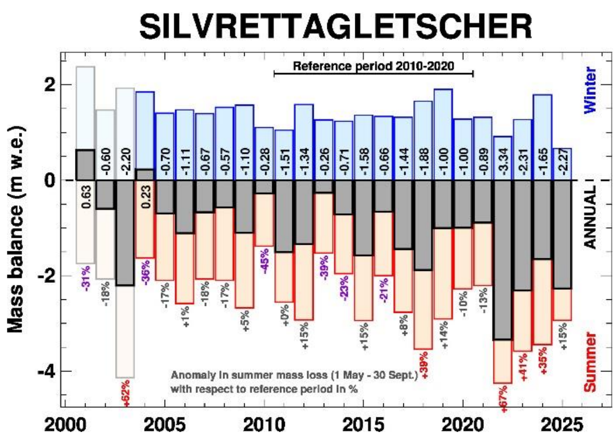

GROSSER ALETSCHGLETSCHER
Reference period 2010-2020
Mass balance (m w.e.)
Winter
ANNUAL
Summer
-0.58 -0.58 -2.02 -0.38 -0.92 -1.66 -1.01 -1.61 -1.68 -0.78 -1.79 -1.81 -0.65 -0.39 -1.75 -0.76 -2.21 -1.29 -1.71 -1.17 -0.18 -2.87 -1.78 -1.14 -1.59
Anomaly in summer mass loss (1 May - 30 Sept.)
with respect to reference period in %
2000 2005 2010 2015 2020 2025

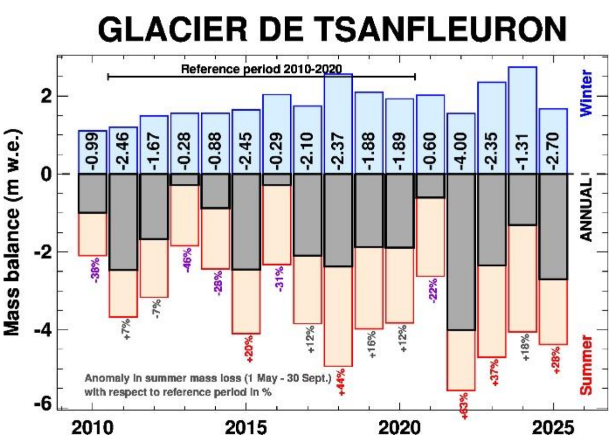

VADRET DAL MURTEL
Reference period 2012-2020
Mass balance (m w.e.)
Winter
ANNUAL
Summer
-0.17 0.78 -0.79 -0.58 -1.31 -1.51 -1.05 -0.53 -0.31 -3.07 -2.48 -0.75 -1.17
Anomaly in summer mass loss (1 May - 30 Sept.)
with respect to reference period in %
2012 2014 2016 2018 2020 2022 2024 2026


VADRET PERS
Reference period 2010-2020
Mass balance (m w.e.)
Winter
ANNUAL
Summer
-0.78 -1.49 -0.60 -1.17 -1.56 -1.42 -1.07 -0.70 -0.76 -0.92 -1.15 -0.62 0.07 -1.12 -0.74 -0.92 -1.31 -0.37 -0.80 -0.63 -3.02 -1.91 -0.87 -1.28
Anomaly in summer mass loss (1 May - 30 Sept.)
with respect to reference period in %
2005 2010 2015 2020 2025


GLACIER DE LA PLAINE MORTE
Reference period 2010-2020
Mass balance (m w.e.)
Winter
ANNUAL
Summer
-0.87 -2.10 -1.20 -0.90 -1.04 -2.31 -0.22 -2.27 -2.11 -1.76 -1.93 -0.96 -4.03 -2.48 -1.97 -2.58
Anomaly in summer mass loss (1 May - 30 Sept.)
with respect to reference period in %
2010 2015 2020 2025


RHONEGLETSCHER
Reference period 2010-2020
Mass balance (m w.e.)
Winter
ANNUAL
Summer
0.06 -0.97 -0.78 -0.19 -1.66 -0.93 -0.19 -0.48 -0.95 -0.46 -1.19 -1.44 -0.72 -0.63 -0.09 -2.42 -1.86 -0.79 -1.39
Anomaly in summer mass loss (1 May - 30 Sept.)
with respect to reference period in %
2010 2015 2020 2025


SILVRETTAGLETSCHER
Reference period 2010-2020
Mass balance (m w.e.)
Winter
ANNUAL
Summer
0.63 -0.60 -2.20 0.23 -0.70 -1.11 -0.67 -0.57 -1.10 -0.28 -1.51 -1.34 -0.26 -0.71 -1.58 -0.66 -1.44 -1.88 -1.00 -0.89 -3.34 -2.31 -1.65 -2.27
Anomaly in summer mass loss (1 May - 30 Sept.)
with respect to reference period in %
2000 2005 2010 2015 2020 2025


GLACIER DE TSANFLEURON
Reference period 2010-2020
Mass balance (m w.e.)
Winter
ANNUAL
Summer
-0.99 -2.46 -1.67 -0.28 -0.88 -2.45 -0.29 -2.10 -2.37 -1.88 -1.89 -0.60 -4.00 -2.35 -1.31 -2.70
Anomaly in summer mass loss (1 May - 30 Sept.)
with respect to reference period in %
2010 2015 2020 2025