The weather in 2022

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Switzerland can look back on clearly the warmest and, regionally, sunniest and driest year on record. The course of the year was characterised by persistently above-average temperatures, a persistent lack of precipitation and plenty of sunshine. The hot summer brought three heat waves and, regionally, a pronounced drought.

As can be seen in Table 1 below, on Jungfraujoch and in the lowland region Berne north of the Alps the temperature 2022 was clearly above normal values 1991–2020. On both measurements sites it was the warmest year since measurements began. On the Jungfraujoch, 2020 was just as warm (Fig. 1).

Precipitation amounts remained massively below the normal values in the Jungfrau region. At the Kleine Scheidegg measurement site, it was the year with the lowest precipitation since measurements began in 1959.

Table 1. Annual values 2022 referring to the parameters temperature and precipitation as well as the deviations from the reference period 1991–2020 for the stations Jungfraujoch and Berne. As precipitation is not measured on Jungfraujoch the values pertaining to the Kleine Scheidegg are used here.

	Jungfraujoch	*Berne*
Average temperature	-5.4 °C	10.9 °C
Deviation	+1.3 °C	+1.6 °C
Precipitation	1187 mm	895 mm
Deviation	72 %	88 %

Temperature record

Averaged over the entire country the annual temperature 2022 reached 7.4 °C (1.6 °C above normal values 1991–2020): this is by far the highest value since measurements started in 1864. The year 2022 in Switzerland was interspersed with very warm seasons and months. Only September brought a slightly below-average temperature nationwide compared to normal values 1991–2020. The year 2022 thus continues the strong warming trend of the past years. From the pre-industrial period 1871-1900 to the most recent 30-year period 1993–2022, the annual average temperature has risen by 2 °C throughout Switzerland.

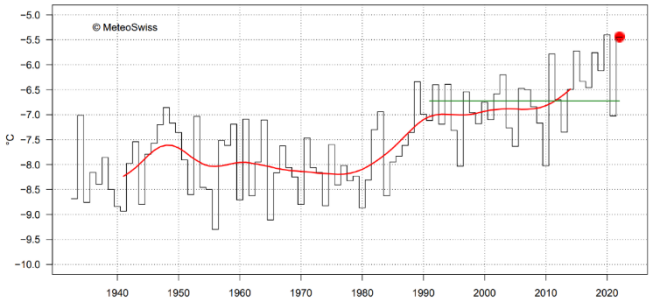


Figure 1. Annual temperature averaged on Jungfraujoch (3580 m asl) since observations started in 1933. The red dot shows the year 2022 (-5.4 °C). The green line shows normal values 1991–2020 (-6.7 °C), the red line the 20-year moving average.

Sunshine records

2022 was characterized by a lot of sunshine throughout the course of the year. Three of the four meteorological stations with homogeneous data series spanning over more than 120 years - Geneva, Basel and Zurich - recorded the sunniest year since measurements began.

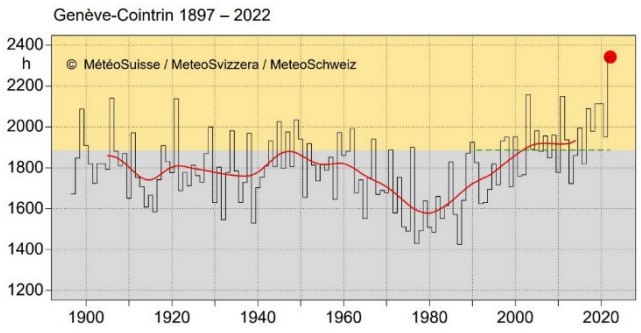


Figure 2. Annual sunshine duration in Genève-Cointrin since observations started in 1897. The red dot shows the year 2022 (2343 hours). The green broken line shows normal values 1991–2020 (1887 hours), the red line the 20-year moving average.

Several stations with homogeneous data series from 1961 onwards also reported the highest values ever. Especially in Geneva, the wide difference of more than 150 sunshine hours to the next lower annual totals is striking.

The stations Genève-Cointrin, La Chaux-de-Fonds, Lugano and Locarno Monti also recorded the sunniest summer half-year. In Neuchâtel, it was the sunniest summer half-year together with the summer half-year of 2003. Basel-Binningen registered only two fewer hours of sunshine in the summer half-year of 2022 than in the record year of 2018.

Mild winter

Averaged over the entire country, the winter temperature in 2021/22 rose 1.1 °C above the 1991-2020 normal values, falling just short of the ten mildest winters since observations began in 1864. On the southern side of the Alps, the second mildest winter since the start of measurements was recorded locally. On a proportional basis, February was the mildest, with temperatures nationwide 1.8 °C above the 1991-2020 normal values.

Sunniest winter south of the Alps

The southern side of the Alps experienced regionally the sunniest winter in the 60-year period of homogeneous data, with a sunshine duration of 130 to 140 % of normal values 1991-2020. Locally, the sunniest January and the second or third sunniest February were recorded.

North of the Alps it was locally the fourth or fifth sunniest winter since measurements began over 120 years ago (Geneva, Berne). January was particularly sunny in the north. At the stations of Geneva, Berne and Zurich with data series spanning over more than 120 years, it ranked second. Only January 2020 brought more sunshine here.

Extremly dry winter South of the Alps

On the south side of the Alps, all three winter months brought little precipitation. Locarno Monti recorded a total of only 40 mm. Since the beginning of observations in 1883 only the winter of 1980/81 brought less precipitation with 14.6 mm. Winter normal values 1991−2020 stand at 223 mm in Locarno Monti. In the rest of Switzerland the winter total precipitation amounted in many parts from 90 to 120 % of normal values 1991−2020.

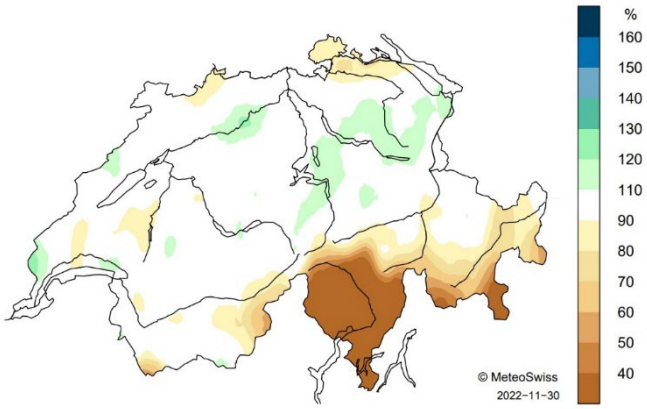


Figure 3. Spatial distribution of precipitation totals in the winter of 2021/22, presented as a percentage (%) of normal values 1991–2020.

Very mild spring

With 1.4 °C above normal values 1991-2020, Switzerland recorded the fourth mildest spring since the start of observations in 1864. The month of May was extremely mild, the second warmest in the national average. It registered at 2.6 °C above normal values. Several stations recorded the warmest May since measurements began, with extreme May records locally. The Grächen station in the Valais reported a May temperature of 3.1 °C above the 1991-2020 normal values. The second warmest was around 1 °C lower. In Segl-Maria in the Upper Engadine, May temperature rose 2.6 °C above normal values. Here, too, the second warmest was around 1 °C lower. Both temperature series date back to 1864.

Plenty of spring sunshine

The four stations with the longest data series on sunshine duration, Basel, Berne, Geneva and Zurich, recorded the fourth sunniest spring since observations began, with around 150 to 160 % of normal values 1991-2020. March in particular brought a lot of sunshine. Zurich recorded the sunniest, Basel and Berne the fifth sunniest March since the start of observations over 120 years ago. Geneva then reported the fifth sunniest May on record.

Little precipitation

In spring, precipitation amounts remained in many parts well below the 1991-2020 normal values and were regionally at record lows. In Meiringen, with only 45% of normal values, the spring total was the lowest for more than 70 years. On the Grimselpass, at 46% of the 1991-2020 normal values, it was the spring with the lowest precipitation total since measurements began in 1932. South of the Alps, it was locally the spring with the lowest precipitation for more than 60 years, with less than 40% of normal values.

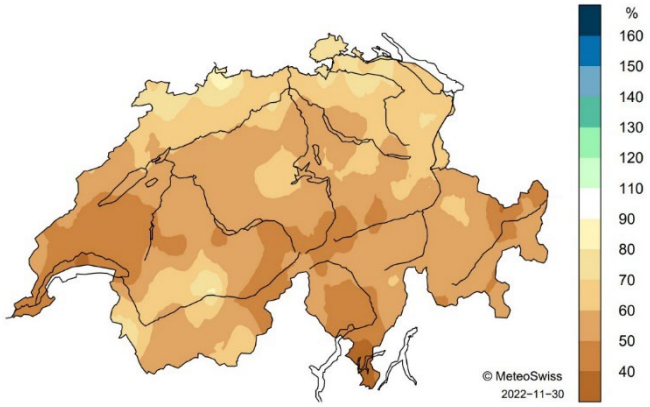


Figure 4. Spatial distribution of precipitation totals in spring 2022, shown as a percentage (%) of normal values 1991–2020.

Little precipitation fell especially in the months of March and May. In the central and eastern parts of the country, it was the month of March with the lowest or second lowest precipitation total since the beginning of measurements at several stations with over 100-year data series. South of the Alps, only 10% of March normal values 1991-2020 fell locally.

In May, the precipitation totals were once again clearly below the 1991-2020 normal values. In western Switzerland and in the Valais, less than 30 % was recorded regionally. At numerous stations in western Switzerland with data series spanning over more than 60 years, it was the May with the lowest precipitation on record. La Chaux-de-Fonds recorded the May with the lowest precipitation total since measurements began in 1900, with only 37 mm (28% of normal values).

Forest fires

Forest fires broke out in the cantons of Berne, Ticino and Valais as a result of the drought that had persisted since winter. The largest forest fire raged from 23 to 25 March in Centovalli in Ticino. Railway lines and roads were temporarily closed. Up to eight fire-fighting helicopters were deployed.

Second-warmest summer

Switzerland can look back on the second warmest summer since observations began in 1864. The summer heat extended over all three summer months. In the national average it was the second hottest June, the fourth hottest July and finally the third hottest August since the start of observations in 1864. This followed the second warmest May on record.

In the nationwide average, the summer temperature was 2.3°C above normal values 1991–2020. Only the legendary hot summer of 2003 brought more warmth, with 3°C above normal values. All regions in Switzerland registered the second warmest summer on record.

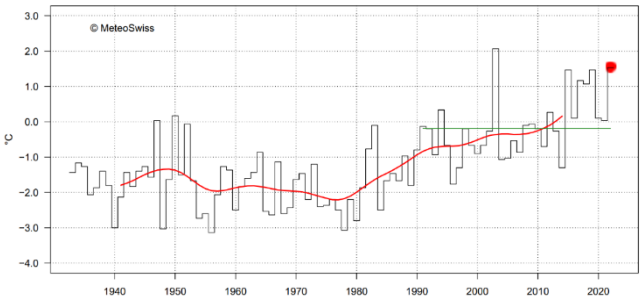


Figure 5. Summer temperature (average June to August) on Jungfraujoch (3580 m asl) since observations started in 1933. The red dot shows the year 2022 (1.5 °C, as 2019 and 2015). The green line shows normal values 1990–2020 (-0.2 °C), the red line the 20-year moving average.

Three heat waves

The first heat wave began in mid-June. Top temperatures were reached at the northern edge of Switzerland and the regions of Neuchâtel, Sion and Biasca with over 36 °C. The highest measured temperature was in Beznau on the northern edge of Switzerland with 36.9 °C, narrowly followed by Biasca in Ticino with 36.6 °C.

Neuchâtel experienced the hottest three-day June period since measurements began in 1864, with a mean daily maximum of 34.6 °C. The previous June record was 32.9 °C (hot summer of 1947) and 32.8 °C (hot summer of 2003).

The heat wave in mid-June came remarkably early. The extreme three-day temperatures recorded in Neuchâtel at such an early point in the year is a rarer event than can be expected every 25 years. Apart from the early timing, however, the June heat spell did not represent anything unique.

Towards the middle of July, Switzerland was hit by a second heat wave. 19 July was the hottest day in July for large parts of the northern side of the Alps. The daily highs rose from between 33 to 35 °C in many places north of the Alps and in the Valais. Locally there were also temperatures of 36 °C and more. South of the Alps, the highest values amounted to between 33 and 34.5 °C.

The third heat wave started at the beginning of August. On the southern side of the Alps, the intense heat was already felt during the last days of July. The daily highs rose to 35 to 37 °C in some areas. On 4 August, Geneva reported the highest temperature of the Swiss summer of 2022 with 38.3 °C.

Long heat waves

The heat wave in July, which particularly affected western and southern Switzerland, was not unique in terms of maximum values. What made it unique was its duration. For 14 consecutive days, Lugano recorded a daily maximum of 30° C or more. At that station, it was the longest persistent heat spell since observations began in 1864. During the hot summers of 2015 and 2003 there were 13 consecutive days here with a daily maximum of 30 °C or more.

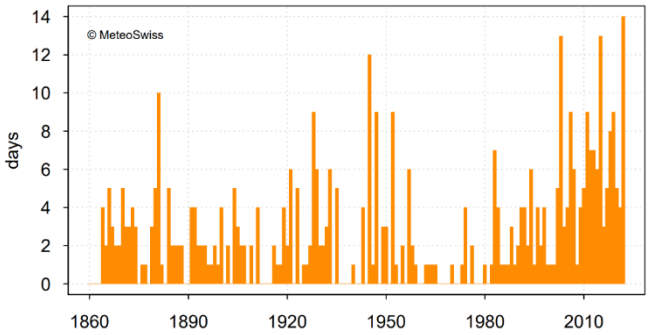


Figure 6. Longest heat spell per year with a daily maximum of 30 °C or more in Lugano.

Many heat-event days

Already in the extremely warm May individual heat-event days were registered in Switzerland. As a consequence, the total of heat-event days rose locally to very high values by the end of summer.

Geneva recorded 41 heat-event days, ranking 2nd since the start of observations in 1864. The record dates from the hot summer of 2003 with 50 heat-event days. Lugano, which has a data series just as long, also reported a 2nd rank event with 38 heat days. There the hot summer of 2003 brought 47 heat-event days. In Sion where the data series started in 1958, 49 heat-event days were counted, narrowly missing the record of 50 heat-event days of summer 2003.

In Stabio in southern Ticino, the record from 2003 was surpassed. While there were 57 heat-event days then, the current year brought 63 heat days. In all other years since measurements began in 1981, the number of heat-event days in Stabio remained below 40.

Record altitude of the zero-degree line

The hot summer of 2022 drove the zero-degree line over Switzerland to a new record altitude of 5184 m, registered on 25 July 2022. In the hot summers of 2015 and 2003, the maximum altitude of the zero-degree line was not within the range of the ten highest values ever measured. Measurements of the daily altitude of the zero degree line have been carried out with balloon soundings since 1954.

Sunshine records in summer

With a sunshine duration of 130 to 150 % of normal values 1991-2020, Geneva and Basel recorded the sunniest and Zurich the second sunniest summer since observations began over 120 years ago. Summer sunshine duration was also within record range at

stations with homogeneous data series spanning over more than 60 years. Lugano, La Chaux-de-Fonds, Neuchâtel and Altdorf reported the sunniest summer, Locarno Monti, Sion, St. Gallen and Lucerne the second sunniest, while in Samedan, Davos and Säntis the summer ranked third.

Substantial drought in certain regions

In many areas of Switzerland summer precipitation totals from June to August reached between 60 and 80 % of normal values 1991–2020. Some regions, especially in western Switzerland, received less than 60 % of normal rainfall totals, while parts of the south side of the Alps, eastern Switzerland and the Central Plateau received over 80 % of normal values. In southern Ticino some low values amounting to less than 40 % of normal values 1991–2020 were recorded.

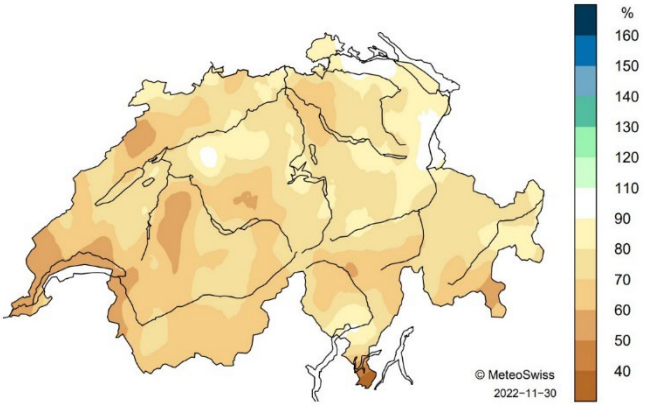


Figure 7. Spatial distribution of precipitation totals in summer 2022, shown as a percentage (%) of normal values 1991–2020.

In many parts June rainfall totals in Switzerland reached between 80 and 120 % of normal values 1991–2020. Individual stations recorded one of the wettest months of June on record.

July, however, brought less than 30 % of normal rain totals to some Swiss regions, locally even less than 10 %. In some areas of south-western Switzerland a July with the least precipitation for over 50 years was recorded. Along with the high temperature and correspondingly high evaporation plus the lack of rain in the months before, the region suffered from a substantial drought.

August precipitation in many areas of Switzerland remained again below average, with only 40 to 70 % of normal values 1991–2020. Locally only 30 % of normal values were recorded. There was abundant rainfall between Schaffhausen and the Lake of Constance with 130 to 180 % of normal values.

Third warmest autumn

October with its record temperatures and the far above-average warmth in November led to the third warmest autumn since observations began in 1864. The national average autumn temperature was 1.7 °C above the normal values 1991-2020. The autumn of 2014 was on a similar level with 1.8 °C above the norm. Only the autumn of 2006 was significantly warmer, with a national average of 2.4 °C above the 1991-2020 normal values.

Record temperature in October

Switzerland recorded the warmest October since measurements began in 1864. The record warmth affected most areas of Switzerland. In many places, the monthly values were between 3 to 4.5 °C above the 1991-2020 normal values. Regionally, the monthly temperature was around 1 °C above the highest October values to date. On a national average, the October temperature rose 3.8 °C above the 1991-2020 normal values. October 2001 ranks second with a significantly lower 3 °C above the norm. This makes it clear how massive the heat event was.

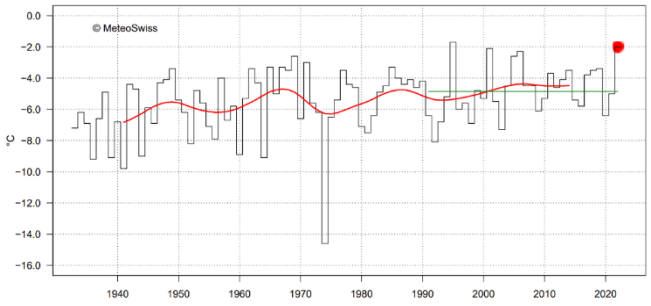


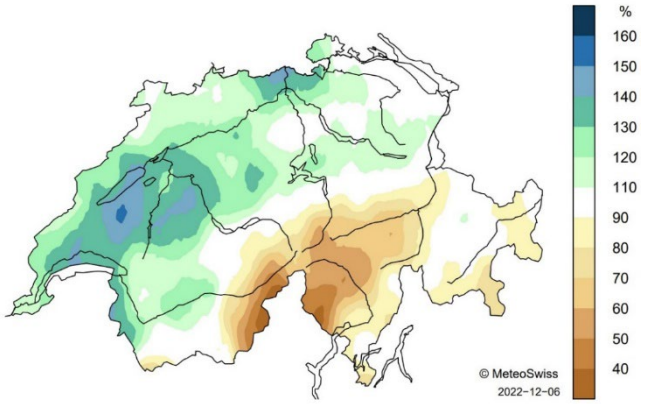
Figure 8. October temperature on Jungfraujoch (3580 m asl) since observations started in 1933. The red dot indicates the current October (-2.0 °C). The green line shows normal values 1991–2020 (-4.9 °C), the red line the 20-year moving average.

Abundant precipitation in western Switzerland

North of the Alps, autumn brought above-average precipitation totals in many parts. In western Switzerland and locally on the Central Plateau they rose to over 130 % of normal values 1991–2020. In the Alps, values amounted to between 80 und 120 % in many areas.

In contrast, the southern side of the Alps and adjacent regions received in many parts only between 60 to 90 % and regionally even less than 50 % of normal values 1991–2020.

Figure 9. Spatial distribution of precipitation in the autumn 2022, shown as a percentage (%) of normal values 1991–2020.



Since the norm is higher in the south, the precipitation totals south of the Alps were often higher than those in the north despite below-average values. In Stabio 391 mm of rain was recorded (75 % of normal values). Neuchâtel registered 339 mm (141 % of normal values).

Extremely mild end to the year

In December, low temperatures prevailed until the middle of the month with frequent snowfall down to low altitudes. A strong warming then caused the snow line to rise to over 2000 metres.

On New Year's Eve, warm subtropical air north of the Alps brought highs of 14 to 16 °C, in north-western Switzerland, and in Foehn valleys temperatures of even over 17 °C were recorded. The highest values in the MeteoSwiss monitoring network were recorded in Delémont with 20.9 °C and Vaduz with 19.3 °C. A number of stations recorded the highest value for the last third of December since the start of observations. In Delémont it was the second highest December value since measurements began in 1959. Elm reported the highest December value, 18 ° C, in the 50-year data series of daily maxima.

Summary

In many regions of Switzerland the annual temperature 2022 was between 1.3 and 1.8 °C above normal values 1991–2020. Western Switzerland and the Valais registered regionally temperatures of between 1.9 and 2.1 °C above normal values. In the Engadine, the values reached between 1 and 1.5 °C above normal values. In the nationwide average the annual temperature rose by 1.6 °C above normal values 1991–2020. It was clearly the warmest year since observations started in 1864.

Annual precipitation 2022 reached 70 to 90 % of normal values 1991–2020. South of the Alps, respective values were between 50 and 75 %. Several stations with data series spanning over more than 60 years reported one of the ten years most lacking in precipitation. In some areas 2022 was locally the year with the lowest precipitation on record. In many parts south of the Alps it was the year with the lowest or second lowest precipitation since the beginning of observations, even in data series going back 100 years or more.

In many parts north of the Alps, the annual sunshine duration total 2022 reached between 120 and 130 % of normal values 1991–2020. In the rest of Switzerland it rose to between 110 and 120 % of normal values. Several stations recorded the sunniest year since the beginning of observations.

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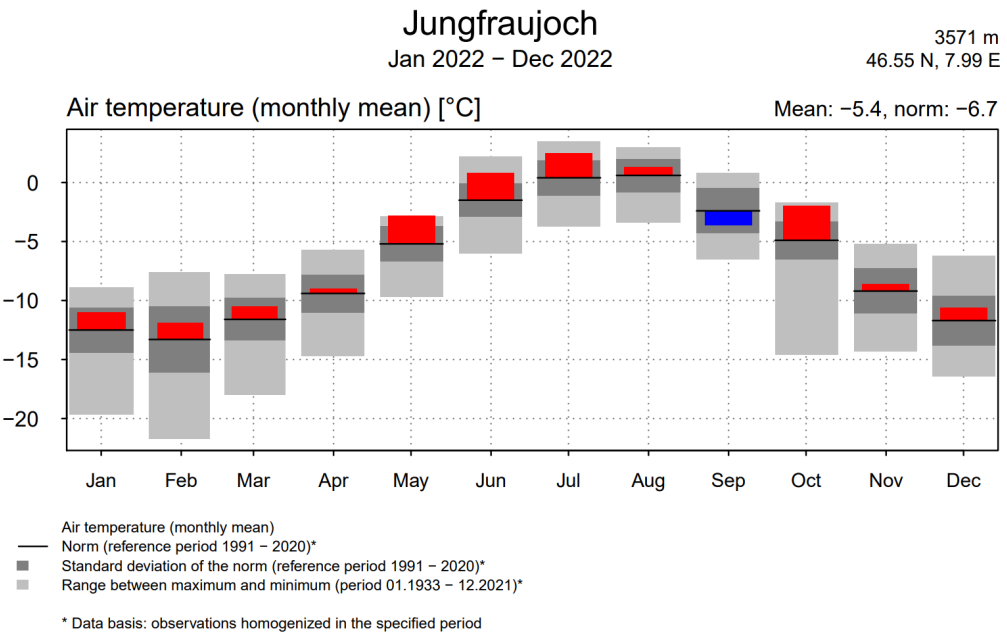

Figure 10. Monthly mean temperature 2022 on Jungfraujoch (3580 m asl) in relation to the monthly long-term mean value 1991–2020 (solid black lines). Red bars show above, blue bars below normal monthly temperatures. The dark grey ranges show the monthly long-term mean fluctuation (standard deviation 1991–2020). The light grey ranges show the highest and the lowest monthly mean temperature since observations started.