The weather in 2019

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Switzerland recorded the fifth-warmest year since the beginning of observations in 1864. Ten months were warmer than normal values 1981–2010, three of these reached extreme values. Averaged over the entire country, summer was the third-warmest, autumn the sixth-warmest since observations started. January and May brought clearly below-average monthly temperatures. Due to a very sunny summer, the year 2019 counted – in certain regions north of the Alps – among the five sunniest since the beginning of observations over 100 years ago.

As can be seen in Table 1 below, the temperature 2019 was well above the normal values 1981–2010 (reference period), with a slightly smaller deviation in the high alpine region Jungfraujoch in comparison to the lowland region Berne north of the Alps. Precipitation amounts were within the normal values at both measurement sites.

Again an extremely warm year

The nationwide annual temperature 2019 reached 6.5 °C, which is the fifth-highest value since the beginning of measurements in 1864. The five warmest years have all been registered after the year 2010. They were – in addition the year in question – the years 2011 with 6.6 °C, 2014 with 6.5 °C, 2015 with 6.6 °C and 2018 with the record value of 6.9 °C.

These five extreme years were 1 °C or more warmer than the temperature records noted before 1980. The massive surge in warm temperatures since 2010 is the second of its kind in the past 30 years. In Switzerland, the first was experienced in the 1990s. From the pre-industrial period 1871−1900 to the latest 30-year period 1990−2019 the annual average temperature in Switzerland has risen by around 2 °C.

On the Jungfraujoch the annual temperature reached -6.1 °C. It was the fourth warmest year since the beginning of the measurement in 1933. At this high elevated site the year 2019 is the fourth in a short succession with a far-above-average temperature.

Table 1: Annual values 2019 referring to the parameters temperature and precipitation as well as the deviations from the reference period 1981–2010 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	-6.1 °C	10.0 °C
Deviation	+1.1 °C	+1.3 °C
Precipitation	1689 mm	999 mm
Deviation	104 %	94 %

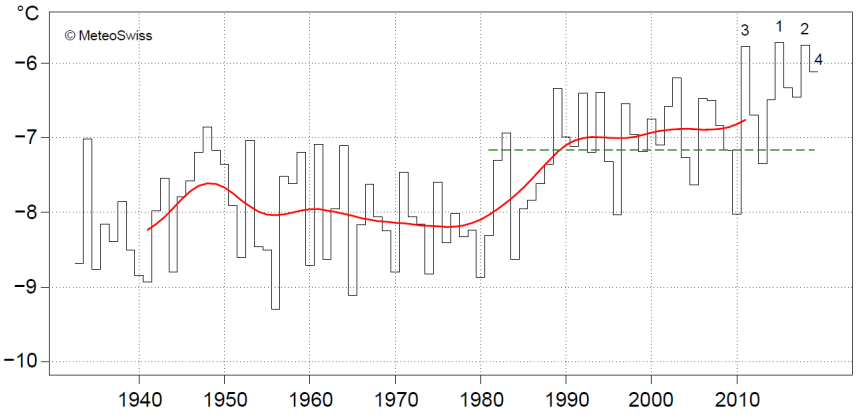

Figure 1:
Annual temperature from 1933 to 2018 on Jungfraujoch (3580 m asl). The year 2018 reached -5.8°C. The red line shows the weighted average over 20 years. The green dashed line shows the Normal 1981–2010 (-7.2 °C).

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Extremely mild winter 2018/19 in the South

In low altitudes south of the Alps the second-mildest winter since the beginning of observations in 1864 was registered. Winter temperature from December to February rose 2 °C above normal values 1981–2010. The record winter of 2007 was only slightly milder with 2.2 °C above normal values. Especially January and February 2019 were considerably milder compared with normal values. With almost 2 °C above normal values, Lugano recorded the fourth-mildest January, Locarno-Monti – with almost 3 °C above normal values – the third-mildest February since the beginning of measurements.

Frequent instances of north-foehn contributed in no small measure to the substantial winter warmth south of the Alps. In these parts winter was also characterized by a lack of precipitation due to the frequent north-foehn situations. In some areas, precipitation totals amounted to only 30 to 40 % of normal values.

Cold and warm in the mountains

In all other regions of Switzerland, the winter of 2018/19 mostly did not figure among the ten mildest since the start of observations. In the mountains winter brought massive temperature changes. After a mild December mountain stations above 1000 m a.s.l. registered the coldest January for over 30 years. Subsequently, mountain temperatures rose to between the second- to fifth-mildest February values since the beginning of observations.

A lot of snow in the Eastern Alps

The persisting lively westerly fronts brought – with the exception of the South – over-average winter precipitation totals in many areas. The biggest precipitation surplus with corresponding good snow conditions was registered in the Eastern Alps with 170 to 200 % above normal values 1981–2010. As a consequence of the large new snow totals there was – in January – a great danger of avalanches in certain regions and access to some Alpine valleys was temporarily interrupted.

Sunny winter

The winter of 2018/19 brought above-average sunshine duration to the whole of Switzerland. Especially February proved to be very sunny, with persistent bright weather in the second half of the month. Basel and Geneva registered the sunniest February since observations started. On the Jungfraujoch it was the fifth sunniest February since measurements began in 1961. This resulted in a winter, which was – in certain regions north of the Alps – the third- to fifth-sunniest since the beginning of observations over 100 years ago.

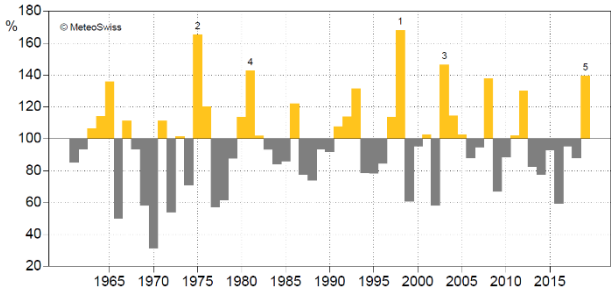

Figure 2. Sunshine duration in February compared with normal values 1981–2010 (100 %) at the meteorological station Jungfraujoch 1961–2019.

Average spring temperature

Averaged over the entire country the year 2019 was within the range of normal values 1981–2010. South of the Alps normal values were exceeded by approximately half a degree while in certain mountain regions slightly below-average values were registered. Just as with the temperature, sunshine duration remained mostly within the range of normal values 1981–2010.

Wet spring in certain regions

Spring brought below-average precipitation to many parts of Switzerland. In certain regions, however, large precipitation totals were recorded. Parts of the Central and Eastern Alps received 150 to 200 % of normal values 1981–2010. Locally, one of the springs with highest precipitation since the beginning of observations was registered. On the Weissfluhjoch precipitation amounted to 577 mm, which is almost 100 mm more than the total in the previous record spring 1978. The measurement series Weissfluhjoch extends back to 1959.

Large amounts of precipitation - 130 to 200 % above the normal values 1981-2010 and over 200% locally - were experienced predominantly in April: in many parts south of the Alps, the Grisons, the Central Alps and the Upper Valais. Record snowfall totals for the month of April were recorded locally.

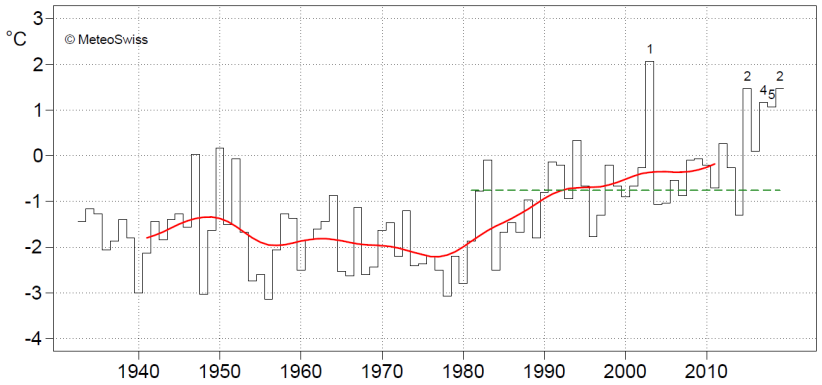

Figure 3. Summer temperature (average June–August) at the meteorological station Jungfraujoch since observations started in 1933. The red line shows the weighted average over 20 years. The green dashed line shows the Normal 1981–2010 (-0.7 °C).

Mountain winter in summer

Regular fresh snowfall and an unusually cool May preserved the Alpine snow cover on a high-winter level. At the transition from meteorological spring to meteorological summer there was still a snow total of around 2.7 m on the Weissfluhjoch at an altitude of 2540 m a.s.l., establishing a new seasonal record. The summer warmth, however, subsequently caused a rapid melting of the snow cover. In the first third of July the Weissfluhjoch was free of snow, more or less in accordance with normal values.

Obligatory extreme summer warmth

Extremely warm summers have become the standard in Switzerland in the past few years. The summer of 2019 was no exception: the third-warmest since observations started in 1864. Nationwide it yielded a temperature of 15.5 °C. The summer warmth 2019 is in good company with the latest summers with similarly warm temperatures: 2018, 2017 and 2015, which came in at between 15.2 °C and 15.6 °C in the nationwide average. Only the legendary hot summer of 2003 was substantially warmer, with a country-wide average of 16.9 °C. Averaged over the whole of Switzerland, summer temperature rose about 2 °C from the pre-industrial period 1871–1900 to the latest 30-year period 1990–2019.

On the Jungfraujoch, together with summer 2015, it was the second warmest summer since measurements began in 1931. The summer temperature reaches 1.5 °C. The legendary hot summer of 2003 brought a summer temperature of just over 2°C on the Jungfraujoch.

The summer warmth culminated in the months of June and July. With a country-wide average of 15.2 °C it was the second-warmest June, along with June 2017, since the beginning of measurements in 1864. Only June 2003 was warmer with 17.3 °C. With 1.2 °C the Jungfraujoch meteorological station also recorded the second warmest June since measurements began in 1933, also along with June 2017. On the Jungfraujoch the record-warmth in June 2003 reached just over 2 °C.

The second-warmest June was followed by the sixth-warmest July since observations started. In a country-wide average it rose to 16.2 °C. Equally warm was July 2018 and only slightly warmer, July 1994. Only the months of July 2015, 2006 and 1983 brought more warmth, with values between 17.4 °C and 17.8 °C.

A lot of sunshine and sufficient precipitation

Extreme summer warmth and a lot of sunshine go hand in hand. In most regions, the summer sunshine duration reached over 120 % of normal values 1981–2010. The extremely warm June was very sunny. North of the Alps there were values of up to 150 %, in the Alps up to 180 % and south of the Alps up to 130 % of normal values 1981–2010. In some regions of Switzerland, it was the sunniest June in the homogeneous measurement series available, going back to 1959. In 2019, Scuol in the Lower Engadine registered the sunniest June ever in its measurement series spanning over 60 years.

In contrast to the extremely warm and extremely dry summer of the previous year, many areas of Switzerland received sufficient precipitation in the summer of 2019. Totals commonly amounted to between 80 and 100 % of normal values 1981–2010. In parts of the Valais and Ticino precipitation totals of between 120 und 140 % of normal values were recorded.

A very mild autumn

After the third-warmest summer Switzerland registered the sixth-warmest autumn since measurements started in 1864. In the nationwide average the autumn temperature amounted to 7.1 °C, or 1.1 °C above the normal value 1981–2010. Especially an extremely mild October contributed to the high autumn temperature. In the country-wide average it was the fifth-warmest October since the beginning of observations in 1864. In some valleys north of the Alps subjected to foehn the mildest or second-mildest October since measurements started was recorded.

Wet autumn in the South

In September there was a general lack of precipitation in Switzerland, while in October there was overall abundant precipitation. Shortly after mid-October, a lot of precipitation fell south of the Alps in a brief period. With a high snow line, the mass of water made the level of Lago Maggiore rise quickly. However, the water level remained below the flood mark. In November there were again large amounts of precipitation south of the Alps. All three autumn months jointly yielded approximately 150 % of normal values 1981–2010. North of the Alps autumn precipitation remained at a normal level.

Vigorous start to the winter on the south-facing slopes of the Alps

With abundant precipitation and a sinking snow line in November, higher areas on the south-facing slopes of the Alps received substantial amounts of fresh snow. In certain parts, the fresh snow total reached new November records. Towards mid-December 2019 there were above-average snow totals in many mid-altitude Alpine areas. On the eastern north-facing slopes of the Alps and in Mittelbünden (middle Grisons area) values were average or slightly below-average level (Source: Institute for Snow and Avalanche Research SLF, Davos).

Extremely mild end to the year

From mid-December onwards frequent south-foehn situations brought extremely mild thaw periods to the northern slopes of the Alps. Towards the end of the year snow depths along all the northern slopes of the Alps sank to 60 to 90% compared to the long-term average. In the southern Valais, northern Ticino and in parts of the Grisons values were above average, reaching 110 to 140% (Source: WSL - Institute for Snow and Avalanche Research SLF).

With a countrywide average of 2.5°C above normal values 1981 – 2010, December 2019 ended as the third-warmest since the beginning of observations 1864. Some foehn stations on the northern slopes of the Alps wrote December record values. A huge December record of 4.4 °C above normal values was registered at the foehn station Meiringen, where measurements began in 1889. Here, the mildest December months up to this point were more than 1°C cooler.

Annual balance

The annual temperature 2019 rose to between 0.8 to 1.2 °C above normal values 1981-2010 in most parts of Switzerland. In the Engadine the values were between 0.5 to 0.7 °C und in the middle and southern parts of the Ticino locally between 1.3 to 1.4 °C above normal values. In the nationwide average Switzerland registered an annual temperature of 1.1 °C above normal values 1981–2010, resulting in the fifth-warmest year since the beginning of observations in 1864.

Annual precipitation 2019 reached 80 to almost 100 % of normal values 1981–2010 in most areas. From the Upper Valais to the northern Ticino and the Gotthard region to the Grisons as well as on the eastern north-facing slopes of the Alps precipitation totals were mostly between 110 to 130 % of normal values.

With regard to sunshine duration, the annual total 2019 amounted to between 110 and 120 % of normal values 1981-2010. In the Alps and south of the Alps 100 to 110 % of normal values were recorded. In Geneva and Basel the year 2019 counts among the five sunniest since observations started over 100 years ago.

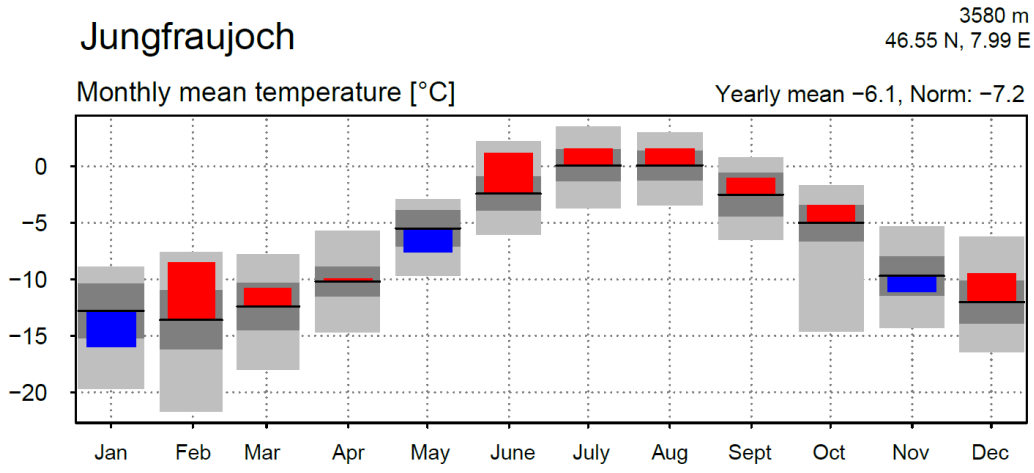

Figure 4: Monthly mean temperature 2018 on Jungfraujoch (3580 m asl) in relation to the monthly long-term mean value 1981–2010 (solid black lines). Red bars show above, blue bars below normal monthly temperatures. The dark grey ranges show the monthly long-term mean fluctuation (standard deviation 1981–2010). The light grey ranges show the highest and the lowest monthly mean temperature since observations started.

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