

Name of research institute or organization:

**MeteoSchweiz, Zürich**

Title of project:

The weather in 2009

Report by

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Typical winter conditions prevailed during the first weeks of the year 2009 in Switzerland. In particular the long duration of snow cover in the plains of the alpine north side gave the impression of a severe winter. The alpine south side (Ticino) also experienced a winter with frequent snowfall conditions even at low altitudes. An abrupt change to almost summer conditions occurred in April. The conditions in April were more like May or beginning of June due to continually high temperatures. The summer 2009 on the other hand was characterized mainly by variable conditions. The month of August was dry and was followed by dry conditions during the autumn months of September and October. Just in time for the beginning of the meteorological winter, Switzerland received a considerable amount of snow.

Table 1 indicates the temperature surplus in 2009 compared to the long-term mean 1961-1990 from both a station on the plains of the northern Alps and from the high mountain areas. In Bern it was +1.5°C and at Jungfrauoch +0.7°C warmer than average. The precipitation amounts in 2009 were higher than normal at Jungfrauoch (109%) and below normal in Bern (93%).

Table 1: Comparison of temperature and precipitation in respect to the long-term mean 1961-1990 at the stations Jungfrauoch and Bern. Precipitation is expressed relative to the average amounts. Because precipitation is not measured at Jungfrauoch, values from Kleine Scheidegg have been used instead.

	Jungfrauoch	Bern
mean temperature	- 7.2 °C	+ 9.4 °C
deviation	+ 0.7 °C	+ 1.5 °C
precipitation	1714 mm	959 mm
relative to average	109 %	93 %

### The year starts with snow

Already on New Year's Eve light snowfall began at many places in Switzerland. Together with the lower than normal temperatures until mid January, Switzerland experienced a wintery start in 2009. In particular the region around Bern was affected by these conditions: Two heavy snowfall events in December 2008 and the subsequent period of temperatures below the freezing point were responsible for the

unusually long phase of continuous snow cover from 10 December 2008 until the end of February 2009. Primarily the long duration of days with snow cover at low altitudes gave the impression of a severe winter in Switzerland. The alpine south side (Ticino) also experienced frequent snowfall events even at low altitudes. The station in Locarno-Monti registered 16 days with snowfall by the end of February, which had occurred only in three winters since 1935. In addition, this winter was one of the coldest during the last 20 years. It was actually the coldest winter since 22 years at Jungfraujoch. Worth mentioning are also the two winter storms “Joris” on 23 January and “Quinten” on 10 February 2009. “Joris” was of exceptional intensity in Switzerland with wind speeds of up to 155km/h in Cressier.

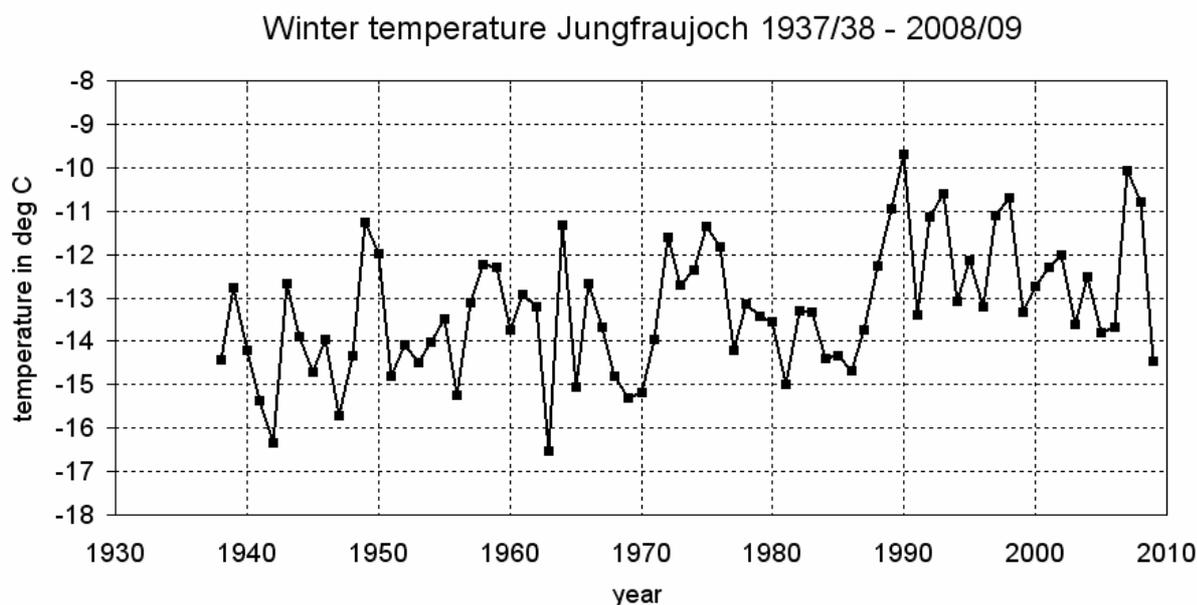


Figure 1: Winter temperatures (1937/38-2008/09) measured at the Jungfraujoch station (homogeneous dataset). The winter 2008/2009 (-14.5°C) indicates the coldest winter during the last 22 years.

### Almost summer in April

In March, winter conditions were predominant with several snowfall events even at low altitudes. There were no mild days in March on the alpine north side, often due to the insistent cold easterly “Bise” winds.

From one day to the next, April brought conditions back to spring and almost to summer in Switzerland. Persistently high temperatures were responsible for climate conditions similar to those in May and June. It was the fourth warmest April measured in Switzerland since measurements began in 1864. With the high temperatures, a very dry period also started. However, during the last days of April substantial precipitation amounts were measured on the alpine south side, in parts of the canton Wallis, the Bernese Oberland and Surselva. In turn, this period was responsible for considerable snow amounts again at higher altitudes.

After the very warm April, the second warmest May since 1864 followed. During the last couple of days in May the daily maximum temperatures reached 32°C and in

Föhn-valleys even higher values. The station with the highest record was Sion with 35.1°C. These conditions were responsible for making spring 2009 the second warmest since 1864. In comparison, spring 2007 was considerably warmer than 2009. At Jungfrauoch the spring 2009 was not even among the 10 warmest since 1937.

### **Variable summer**

In contrast to spring, the summer 2009 was marked by highly variable conditions. Primarily the months of June and July were dictated by high temperature fluctuations. Sequences of summer temperatures were interrupted by depressions of considerable cooling that coincidentally occurred often on the weekends. Noteworthy is that the temperatures usually dropped to the long-time normal temperatures or slightly below. With respect to precipitation, July was mainly wet, and especially the alpine south side experienced severe thunderstorms. Lugano received with 397mm the highest amount of precipitation in July since the measurements in 1864. A considerable contribution to this amount came from two thunderstorms, the first with 73mm (15 July 09) and the second with 99mm (17 July 09) of precipitation.

### **Late summer heat**

Finally, summer established itself in August. The hottest phase of the year extended from 12 to 21 August 2009. This phase again showed extremely high monthly values: Hence, August 2009 was the third warmest since 1864.

### **Dry in autumn**

By August 2009 Switzerland was short on precipitation. Prevalent were amounts below 60% of the normal amounts, and locally even less. These conditions continued in September and were slightly less prevalent in October. In addition to the dry conditions, the temperatures were relatively mild in September and beginning of October. November 2009 was again very mild. Considerably higher monthly temperatures were measured only in November 1994. Similar November 2009 temperatures were recorded in 2006.

### **Winter starts at the end of November**

After a first short winter episode in the mountains on 12 October 2009 further snowfall events were a long time away. The mild conditions during November were able to melt the entire snow from October up to high altitudes.

With strong southerly flows on 29 November, intensive snowfall began at higher altitudes of the alpine south side. On the following day the alpine north side also received a snow cover even at low altitudes due to cold air from the west. The entire alpine ridge received considerable snow amounts. With the beginning of December 2009 values from 100% up to 150% of the normal snow amounts during this season were measured. The central and eastern Alps even received 200%. Arctic air inflow on 20 December 2009 brought minimum temperatures of -12 to -17°C at low altitudes on both sides of the Alps. La Brévine registered with -34.2°C the coldest temperature of the year 2009. This was followed by a rapid warming due to south Föhn on the alpine north side and again heavy snowfall on the alpine south side.

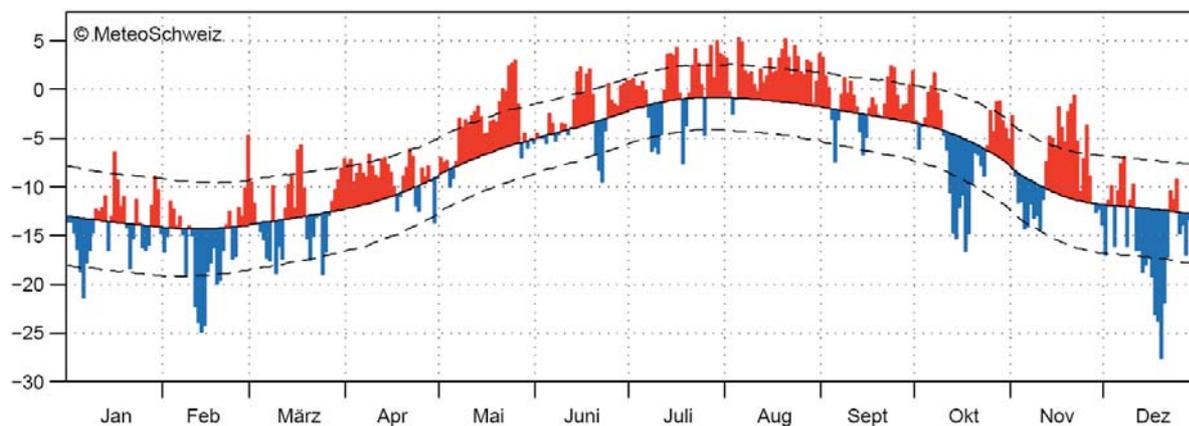


Figure 2: Time series of the daily mean temperatures in 2009 measured at the station Jungfrauoch. Color bars represent anomalies in respect to the long-term mean 1961-1990 and red indicates positive and blue negative anomalies. The dashed lines represent the standard deviation.

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