

Information on the climate in Luxembourg in 2013

Station: Luxembourg/Findel-Airport (WMO 06590, 376 m, a.s.l.)

Reference period: WMO normal period 1961 to 1990

1. Air temperature

Anomalies with respect to 2013

The annual mean air temperature for 2013 at Luxembourg Findel-Airport was 9.0 °C. The anomaly of the annual mean air temperature relative to the average of the reference period from 1961 to 1990 resulted in plus 0.7 K. The total number of 91 frost days and 26 ice days were slightly higher than the long-term climate normal. In 2013 the number of summer days (35) and hot days (10) exceeded the climate normal by 11 days and 6 days, respectively.

Anomalies with respect to seasons

The winter 2012/2013 showed a mean air temperature of 0.9 °C. The air temperature was 0.2 K above the normal, significantly colder than previous winter periods in the 1990s and the winters 2006/2007 as well as 2007/2008. However, the winter 2012/2013 was slightly warmer than the winters between 2008 and 2011. In winter 2012/2013 the days with frost (53) were slightly below the normal. Ice days (27) occurred slightly more than the normal. The winter season showed the third-least sunshine since the records started in 1947. Spring mean air temperature was 0.9 K below the normal, the coldest spring since 1987 and the seventh-coldest spring since 1947. The spring season was characterized by 31 frost days and 2 ice days. The number of frost days was considerably above the long-term average (19 days). Summer mean air temperature in 2013 was at 18.3 °C, deviating by plus 2.2 K from the normal. This summer was the eighth-warmest in Luxembourg since 1947. The number of summer and hot days reached 31 days and 10 days respectively, both are above the climate normal. The seasonal average in autumn was 9.8 °C, thus 1.0 K higher than the long-term average (1961-1990).

Anomalies with respect to single months

In 2013 all months except for February, March and May were above the 1961-1990 normal (Figure 1).

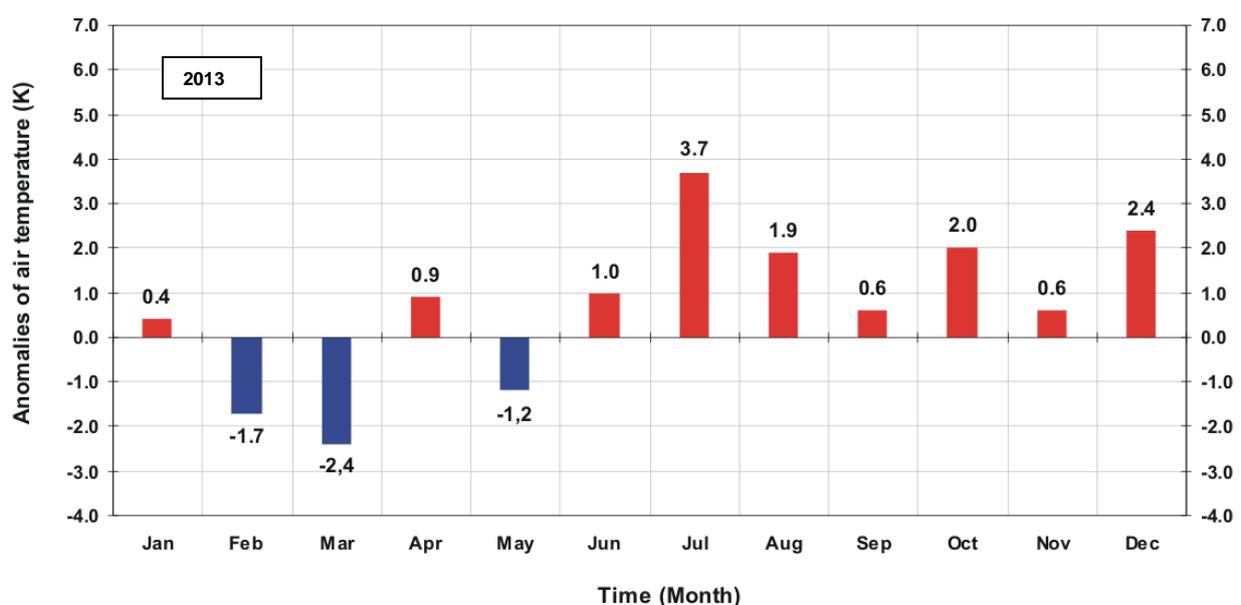


Fig. 1: Anomalies of monthly mean air temperatures (K) relative to the WMO normal period from 1961 to 1990 at Luxembourg/Findel (WMO 06590, 376 m, a.s.l.) in 2013.

Mild weather was predominant in the beginning and end of January causing the monthly mean air temperature to rise 0.4 K above the long-term average. In February cold post-frontal air masses associated with the succession of numerous low-pressure systems were dominant over Luxembourg. The monthly mean air temperature was 1.7 K below the climate normal (1.1 °C). During March a pronounced high-pressure system over Northern Europe resulted in a long period with cold north-easterly winds. The monthly mean air temperature (1.6 °C) was 2.4 K below the long-term average. March 2013 was the seventh-coldest March since 1947. From mid-April on warm air masses caused the mean air temperature to rise up to 8.4 °C. In May most of Central Europe was influenced by a persistent upper-level low-pressure system with long rainy and cool weather periods. The monthly mean air temperature was as low as 10.6 °C. Unsettled weather during the last decade in June caused a monthly mean air temperature of 15.9 °C, although the absolute temperature maximum during summer 2013 has been recorded on June 18 (32.7 °C). Extremely sunny and warm weather during July caused the mean air temperature to rise up to 20.6 °C, resulting in the fifth-warmest July in station history. The mean air temperature for August was 18.3 °C. The mean air temperature in September (14.0 °C) was slightly above the normal, deviating by plus 0.6 K. In October south-westerly winds with warm and moist air masses dominated over Luxembourg. The mean air temperature was 11.1 °C (deviation of plus 2.0 K from normal), the fifth-warmest October since 1947. November 2013 showed a mean air temperature of 4.4 °C. Predominantly air masses originating from the Atlantic Ocean caused a mild December. The mean air temperature reached 3.4 °C, ranking as the eighth-warmest December since 1947.

Table 1: Monthly and annual mean air temperatures (°C) as well as anomalies (K) relative to the WMO normal period from 1961 to 1990 at Luxembourg/Findel (WMO 06590, 376 m, a.s.l.) in 2013.

2013	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Air temperatures (°C)	0.4	-0.6	1.6	8.4	10.6	15.9	20.6	18.3	14.0	11.1	4.4	3.4	9.0
Normals (1961-1990)	0.0	1.1	4.0	7.5	11.8	14.9	16.9	16.4	13.4	9.1	3.8	1.0	8.3
Anomalies (K)	0.4	-1.7	-2.4	0.9	-1.2	1.0	3.7	1.9	0.6	2.0	0.6	2.4	0.7

Extremes and peculiarities

Due to the duration of the cold wave during the last two decades in March the weather situation can be referred to as exceptional. The minimum air temperature was recorded on March 15 (-10.9 °C). The last decade in October 2013 was characterized by high air temperatures. A temperature maximum of 21.8 °C occurred on October 22. This is the third-highest maximum air temperature that was ever recorded in the last decade of October at Luxembourg Findel-Airport. The absolute third decadal maximum occurred on October 26, 2006 (24.0 °C). No absolute temperature records were recorded in 2013.

2. Precipitation amount

In this study, observational days for precipitation are based on daily sums between 06 UTC and 06 UTC of the following day.

Anomalies with respect to 2013

The annual precipitation amount reached 962 mm in 2013. Annual rainfall was 10% higher than the long-term average of 875 mm (1961 to 1990).

Anomalies with respect to seasons

Seasonal precipitation in winter 2012/2013 amounted to a total of 215 mm at Luxembourg Findel-Airport, close to the long-term average. In spring the precipitation amount reached 271 mm. The seasonal precipitation total was about 28% higher than the 1961 to 1990 climatological normal (212 mm). Seasonal precipitation in summer amounted to 225 mm and was close to the normal (222 mm). Luxembourg Findel-Airport recorded 340 mm in autumn, significantly higher (about 50%) than the normal of the 30-year period (228 mm). The autumn 2013 was the sixth-wettest autumn recorded since 1947.

Anomalies with respect to single months

In January and February 2013 low precipitation amounts of 39 mm and 30 mm were registered at Luxembourg Findel-Airport (Figure 2). Both months showed precipitation of 32 mm below the long-term average. Due to a wet December with precipitation amounts of 146 mm, the entire meteorological winter period was close to the normal. The pronounced high-pressure situation in the first half of spring resulted in a dry March (47 mm), whereas precipitation in April was close to the normal.

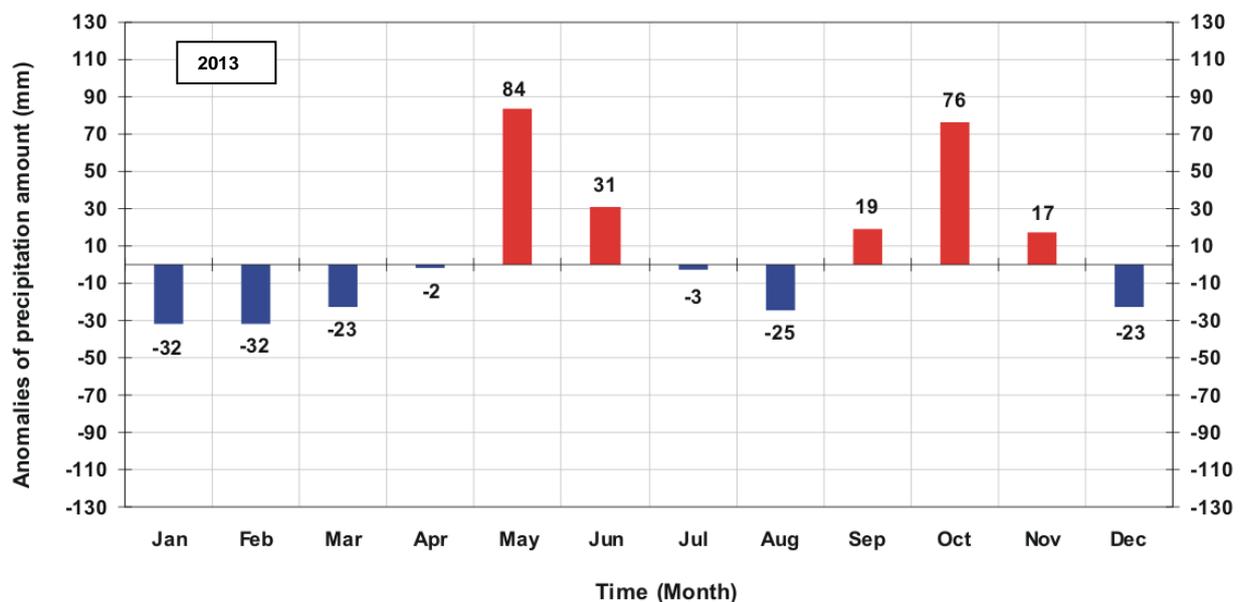


Fig. 2: Anomalies of monthly precipitation amount (mm) relative to the WMO normal period from 1961 to 1990 at Luxembourg/Findel (WMO 06590, 376 m, a.s.l.) in 2013. Observational days for precipitation are based on daily sums between 06 UTC and 06 UTC of the following day.

In May a stationary upper-level low-pressure system over Central Europe with extensive rainfall events resulted in a monthly precipitation amount of 165 mm, twice as much the long-term average. May 2013 was the third-wettest May since the beginning of measurements in 1947. Warm and moist air masses of Mediterranean origin caused frequent thunderstorms. A funnel cloud associated with a severe thunderstorm was observed on May 7 in the southern part of Luxembourg. Unstable weather conditions with heavy precipitation events especially in mid-June resulted in a monthly precipitation amount of 113 mm, 31 mm above the long-term average. Precipitation amounts in July were close to the normal. A pronounced high-pressure system with dry weather periods caused monthly precipitation in August to be as low as 47 mm. In contrast to 2012 all months in autumn 2013 show precipitation amounts above the climate normal. Unstable weather conditions and the advection of warm and moist subtropical air masses caused abundant precipitation intermittently. In September precipitation summed up to 89 mm. Precipitation in October with a total amount of 151 mm exceeded the long-term average by nearly 200%. This was the fourth-wettest October in the station history since 1947, only exceeded by October 1981, 1987 and 1998. November precipitation amounted to 100 mm, exceeding the normal (1961-1990) amount by 17 mm. Autumn 2013 was followed by a relative dry December, especially in the first two decades, with precipitation amounts of 57 mm. Almost one third of the monthly precipitation amount occurred on one single day, December 28 with 16.4 mm.

Table 2: Monthly and annual precipitation amount (mm) as well as anomalies (mm) relative to the WMO normal period from 1961 to 1990 at Luxembourg/Findel (WMO 06590, 376 m, a.s.l.) in 2013. Observational days for precipitation are based on daily sums between 06 UTC and 06 UTC of the following day.

2013	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation amount (mm)	39	30	47	59	165	113	65	47	89	151	100	57	962
Normals (1961-1990)	71	62	70	61	81	82	68	72	70	75	83	80	875
Anomalies (mm)	-32	-32	-23	-2	84	31	-3	-25	19	76	17	-23	87

Extremes and peculiarities

A 10 minutes maximum precipitation amount of 16.4 mm occurred on June 19, 2013. This precipitation intensity is a new historical record since 1966, topping the previous June record from 1985 and 2005 with 15 mm. The total monthly precipitation of June 2013 was not exceptional but the intensity of the two extreme precipitation episodes between the June 19 and 20 can be referred as unprecedented. No absolute extremes in monthly precipitation amount and intensity were recorded at Luxembourg Findel-Airport in 2013.