

Information on the climate in 2018

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

Reference period: WMO normal period 1981 to 2010 (tables: 1981 to 2010 and 1961 to 1990)

1. Air temperature**Anomalies with respect to 2018**

The annual mean air temperature for 2018 calculated by MeteoLux for its station at Luxembourg/Findel-Airport was 11.1 °C. The anomaly of the annual mean air temperature relative to the average of the reference period from 1981 to 2010 resulted in plus 1.8 K. The total number of 30 frost days and 4 ice days were considerably lower than the long-term climate normal (44 days, respectively 12 days). In 2018 the number of summer days (76) and hot days (13) exceeded the normal significantly by 43 days, respectively 9 days.

Anomalies with respect to seasons

The winter 2017/2018 showed a mean air temperature of 1.9 °C, deviating plus 0.5 K from the normal. In winter 2017/2018 the days with frost (47) were slightly below the normal and the number of ice days (8) was significantly below the average of 16 ice days for the reference period 1981–2010. Spring mean air temperature (10.9 °C) was 1.9 K above the normal. The spring season was characterized by 10 frost days and no ice days. The number of frost days was slightly below the long-term average (13 days). A total of 14 summer days were observed in spring. The normal for this period is three days. The summer mean air temperature in 2018 was 20.1 °C, deviating by plus 2.8 K from the normal. During this summer 55 summer days and 13 hot days occurred. This significantly exceeds the climate normal (28, respectively 4 days). The seasonal average in autumn was 11.1 °C, which is 1.7 K above the long-term average (1981–2010).

Anomalies with respect to single months

In 2018 the majority of months except for February and March exceeded the 1981–2010 normal (Figure 1). Due to the succession of several low-pressure systems, mild and stormy weather was predominant during many periods in January. Monthly mean air-temperatures in January were 3.7 K above the climate normal. During February high-pressure periods caused air temperatures to drop significantly above snow-covered surfaces, in particular during the third decade. This cold spell was caused due to a shift in the polar vortex and the development of a strong high-pressure system over Scandinavia. Monthly mean air-temperatures in February decreased to -1.3 °C, thus 2.9 K below the normal of the reference period 1981 to 2010. Due to the advection of cold air from north-western Russia to Central Europe, the cold weather period lasted until the first decade of March. From then on low-pressure systems caused unsettled weather and the advection of mild subtropical air masses to reach Luxembourg, only interrupted by a short cold spell at the end of the decade. Monthly mean air-temperatures in March were 1.5 K below the climate normal. High-pressure areas over central Europe and Scandinavia blocked low-pressure systems away from Luxembourg for most of April and May. The above-normal temperatures in April (4.0 K) were caused by lower than normal cloud amounts and more sunshine than normal. Subtropical air masses caused monthly mean air temperatures to rise significantly above the climate normal by 3.3 K in May. The blocking weather pattern over Europe continued during the summer months. Due to the strong subsidence the summer months were characterized by remarkable positive temperature anomalies. Hence, monthly mean air temperatures in June were 2.3 K, in July 3.9 K and in August 2.2 K above the long-term average. Persisting high-pressure during September resulted in a monthly mean air temperature of 15.6 °C, deviating 1.7 K from the normal. Monthly mean air-temperatures in October were exceptionally high, thus 2.3 K above the climate normal. The unusually warm weather continued in November. This led to a monthly mean air temperature of 5.9 °C, deviating 1.2 K from the long-term average. With only a few exceptions, low-pressure systems with generally moderate warm air prevailed in December 2018, resulting in a positive anomaly of 1.9 K.

Extremes and peculiarities

Air temperatures in 2018 (11.1 °C) were unprecedented, 2018 was the warmest year since weather records began in 1947. January 2018 (4.5 °C) is the second-warmest January in station history since 1947. This event can be referred to as unprecedented. April 2018 (12.7°C) was the third-warmest April and May 2018 (16.3 °C) was the warmest May since 1947. With maximum air temperatures of 24.1 °C a new station record for the first decade of April was established at Luxembourg/Findel-Airport on April 8, 2018. The maximum air temperatures, recorded at Luxembourg/Findel-Airport on April 20, 2018 (27.9 °C), exceeded the existing absolute record from April 1949 (27.0 °C). May 2018 has been the warmest May ever recorded at Findel Airport since 1947. This event can be referred to as unprecedented. All summer months rank among the top 5 warmest months. Hence, summer 2018 has been the second-warmest summer ever recorded since 1947, only exceeded by summer 2003. This event can be referred to as exceptional. The number of summer days recorded at Findel (56 days) was exceptional and showed the second-highest number after 2003. With a total of 76 summer days over the year, 2018 exceeds the former record from 2003 with 63 summer days. The number of summer days in 2018 was unprecedented. Autumn 2018 ranked as the third-warmest autumn in station history.

2. Precipitation amount

In this report observed days of precipitation are based on daily sums between 06 UTC and 06 UTC on the following day.

Anomalies with respect to 2018

The annual precipitation amount reached 783 mm in 2018. Annual rainfall was about 13.0 % lower than the long-term average of 898 mm (1981 to 2010).

Anomalies with respect to seasons

Seasonal precipitation in winter 2017/2018 amounted to a total of 277 mm at Luxembourg/Findel-Airport, about 22.5% above the long-term average (226 mm). In spring the precipitation amount reached 232 mm. The seasonal precipitation total was about 12.5% higher than the 1981 to 2010 climate normal (206 mm). Seasonal precipitation in summer amounted to just 138 mm, significantly below the normal for the 30-year period from 1981 to 2010 (226 mm). MeteoLux recorded only 86 mm in autumn, thus significantly lower than the normal (239 mm) at Findel-Airport. The number of precipitation days (≥ 0.1 mm) in winter 2017/2018 reached 59, exceeding significantly the climate normal (48 days). During spring the precipitation days (≥ 0.1 mm) reached 41 days, slightly lower than the long-term average (44 days). In summer the number of precipitation days (32) was considerably below the climate normal (40 days). The number of precipitation days (≥ 0.1 mm) in autumn 2018 reached 28, thus significantly lower than the normal (46 days).

Anomalies with respect to single months

With the exception of January, May and December precipitation amounts throughout 2018 were all lower than the climate normal. Considerable deficits occurred in February, July, September, and October (Figure 2).

Intensive low-pressure systems throughout all decades of January 2018 caused high amounts of precipitation and flooding in many places in Luxembourg. In January 143 mm of precipitation were measured, nearly 86% above the climate normal. Pronounced high-pressure periods with northerly and easterly wind directions during February and March caused dry weather in Luxembourg. Precipitation amounts in February were only 16 mm, in March 47 mm, thus significantly below the climate normal

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(February minus 75%, March minus 32%). In April the precipitation was close to the 1981-2010 average. In May small differences in atmospheric pressure across Western and Central Europe resulted in intense thunderstorm activity with extreme rainfall events and local flash floods across Luxembourg. Precipitation amounts in May were 128 mm at Luxembourg/Findel-Airport, significantly exceeding the climate normal by 62%. Due to the large number of high-pressure periods the strong subsidence caused precipitation deficits during all summer months. Precipitation amounts in June were about 20% below the climate normal. July and August precipitation amounted to only 15 mm and 59 mm, about 79% and respectively 21% less than the long-term average. Within the persisting high pressure Luxembourg was very dry. Due to the dry weather periods in September only 22 mm of precipitation was measured at Findel Airport, nearly 71% below the normal. In October and November Luxembourg was still dominated by high-pressure weather. October precipitation amounted to only 16 mm, which is about 82% below the long-term average. The precipitation amounts in November were 48 mm, nearly 37% below the 1981-2010 average. Due to frequent low-pressure systems, precipitation amount in December reached 168 mm, exceeding the long-term average by roughly 93%.

Extremes and peculiarities

January 2018 (142.9 mm) is the five-wettest January in the station history since 1947. Heavy thunderstorms on April 29 caused new station records for certain parameters of precipitation intensity. On this day intensities of 12.9 l/m² within 30 minutes, 16.6 l/m² within 60 minutes and 20.8 l/m² within 3 hours were recorded at Luxembourg/Findel-Airport. Autumn 2018 (85.9 mm) ranks on number three of the driest months at Luxembourg/Findel-Airport since station history in 1947. December 2018 has been the fourth-wettest December ever recorded since 1947 at Findel.

Figures

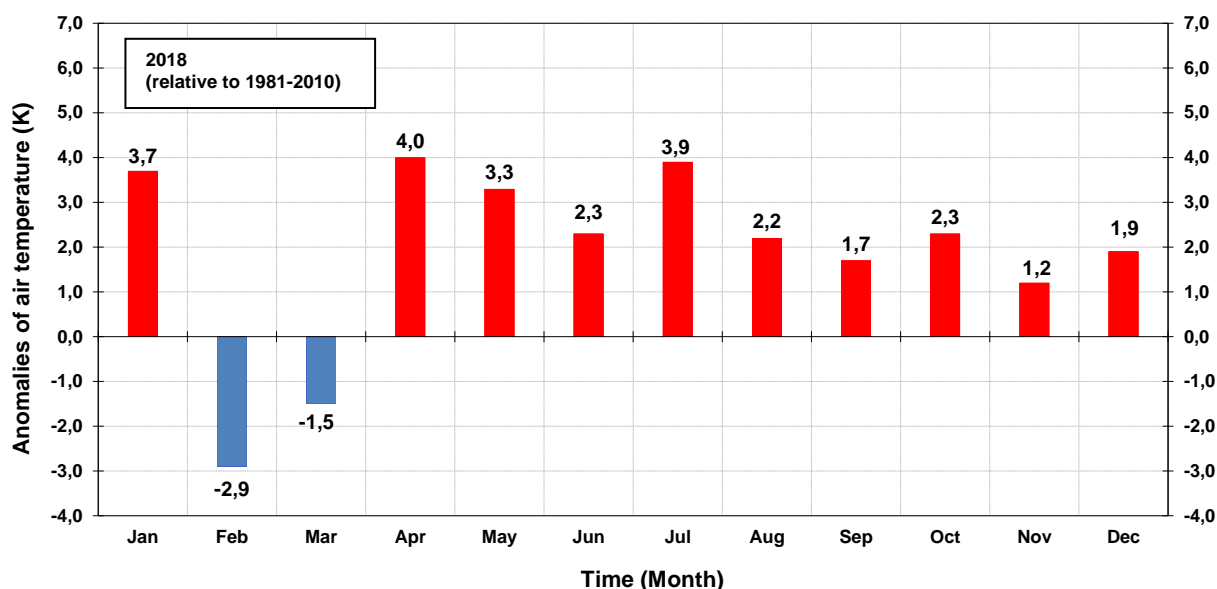


Fig. 1: Anomalies of monthly mean air temperatures (K) relative to the WMO normal period from 1981 to 2010 at Luxembourg/Findel (WMO 06590, 376 m, a.s.l.) in 2018.

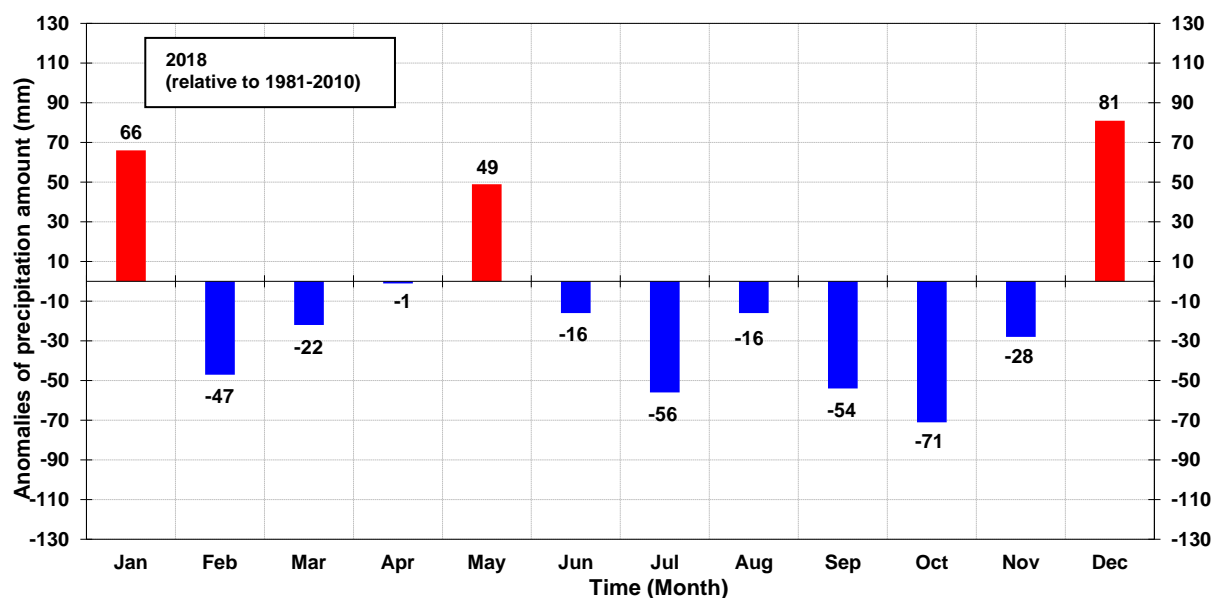


Fig. 2: Anomalies of monthly precipitation amount (mm) relative to the WMO normal period from 1981 to 2010 at Luxembourg/Findel (WMO 06590, 376 m, a.s.l.) in 2018. Observational days for precipitation are based on daily sums between 06 UTC and 06 UTC of the following day.

Tables

Table 1: Monthly and annual mean air temperatures (°C) as well as anomalies (K) relative to the WMO normal periods from 1981 to 2010 and from 1961 to 1990 at Luxembourg/Findel (WMO 06590, 376 m, a.s.l.) in 2018.

2018	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Air temperatures (°C)	4.5	-1.3	3.7	12.7	16.3	18.2	22.1	19.9	15.6	11.8	5.9	3.7	11.1
Normals (1981-2010)	0.8	1.6	5.2	8.7	13.0	15.9	18.2	17.7	13.9	9.5	4.7	1.8	9.3
Anomalies (K)	3.7	-2.9	-1.5	4.0	3.3	2.3	3.9	2.2	1.7	2.3	1.2	1.9	1.8
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)	4.5	-2.4	-0.3	5.2	4.5	3.3	5.2	3.5	2.2	2.7	2.1	2.7	2.8

Table 2: Monthly and annual precipitation amount (mm) as well as anomalies (mm) relative to the WMO normal period from 1981 to 2010 and from 1961 to 1990 at Luxembourg/Findel (WMO 06590, 376 m, a.s.l.) in 2018. Observational days for precipitation are based on daily sums between 06 UTC and 06 UTC of the following day.

2018	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation amount (mm)	143	16	47	57	128	64	15	59	22	16	48	168	783
Normals (1981-2010)	77	63	69	58	79	80	71	75	76	87	76	87	898
Anomalies (mm)	66	-47	-22	-1	49	-16	-56	-16	-54	-71	-28	81	-115
Normals (1961-1990)	71	62	70	61	81	82	68	72	70	75	83	80	875
Anomalies (mm)	72	-46	-23	-4	47	-18	-53	-13	-48	-59	-35	88	-92