

**Information on the climate in 2020**

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 2020**

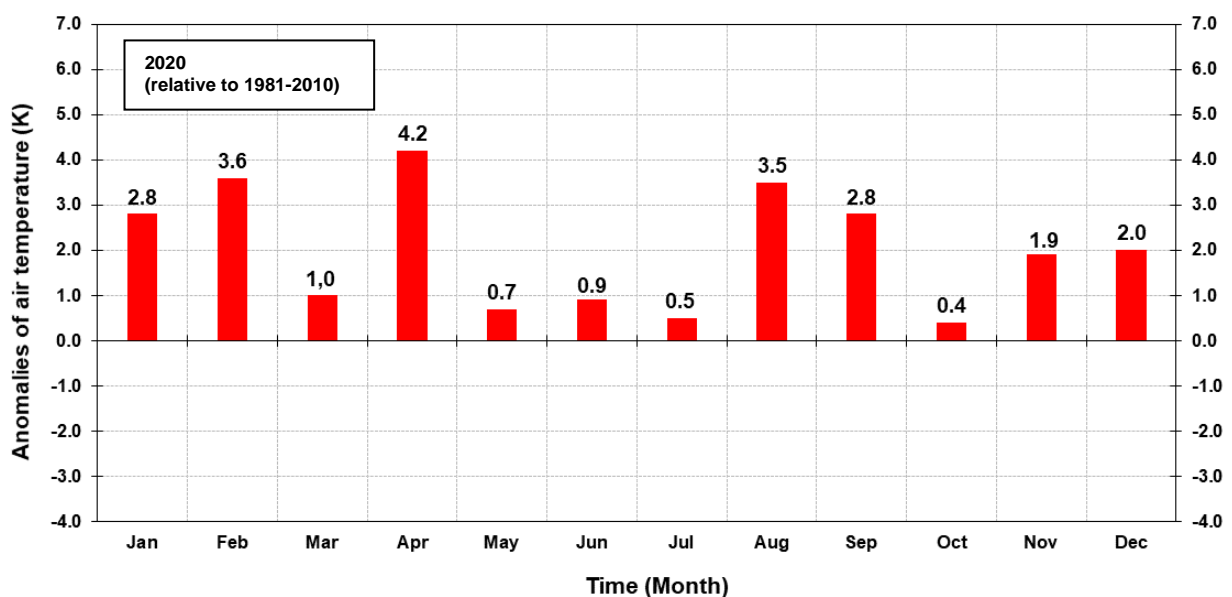
The annual mean air temperature for 2020 calculated by MeteoLux for its station at Luxembourg/Findel-Airport was 11.3 °C. The anomaly of the annual mean air temperature relative to the average of the reference period from 1981 to 2010 resulted in plus 2.0 K. The total number of 48 frost days was considerably below the long-term climate normal (74 days). No ice days occurred in 2020 (normal = 18 days). In 2020 the number of summer days (53) and hot days (16) exceeded the normal significantly by 20 days, respectively 12 days.

**Anomalies with respect to seasons**

The winter 2019/2020 showed a mean air temperature of 4.4 °C, deviating plus 3.0 K from the normal. During this winter the days with frost (29) were significantly below the normal of 51 days of the reference period 1981–2010. No ice days occurred. Spring mean air temperature (10.9 °C) was 1.9 K above the normal. The spring season was characterized by 9 frost days and no ice days. The number of frost days was below the long-term average (13 days). No summer days were observed in spring. The normal for this period is three days. The summer mean air temperature in 2020 was 18.9 °C, deviating by plus 1.6 K from the normal. During this summer 38 summer days and 13 hot days occurred. This significantly exceeds the climate normal by 10 days, respectively 9 days. The seasonal average in autumn was 11.1 °C, which is 1.7 K above the long-term average (1981–2010). During autumn 11 summer days (climate normal 2 days), 3 hot days and 7 frost days occurred.

**Anomalies with respect to single months**

In 2020 all months exceeded the 1981–2010 normal (Figure 1, Table 1).



**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 2020.

Between numerous Atlantic low-pressure areas over northern Europe and a high-pressure zone between the Iberian Peninsula and Turkey, a strong southwesterly flow ensured almost continuously mild air masses in Luxembourg. Monthly mean air-temperatures in January were 2.8 K above the climate normal. This weather pattern with strong southwesterly airflows and the steady supply of mild air masses was dominant through February, resulting in mean air temperatures 3.6 K above the long-term average. The unsettled and mild westerly weather conditions continued into the second third of March. Monthly mean air-temperatures in March were 1.0 K above the climate normal. During most of April, high pressure systems over central and Eastern Europe, accompanied by southerly air flows, were dominant. Thus, air temperatures in Luxembourg were significantly above the average (4.2 K). In May the weather pattern changed. Low-pressure systems alternated with high-pressure systems. Air temperatures were only 0.7 K above the climate normal. In June, more low pressure influence prevailed in Luxembourg again and air temperatures were slightly above the long-term average (0.9 K). Due to changeable weather with some high-pressure periods air temperatures in July had been just 0.5 K above the climate normal. Due to an extensive high-pressure system developed over Europe hot air masses from the Mediterranean were transported to Europe. In the first half of August prolonged very high temperatures occurred over Luxembourg. Monthly mean air-temperatures in August were exceptionally high, thus 3.5 K above the climate normal. The changeable weather from the end of August extended into the first decade of September. Between a high-pressure system shifting towards Eastern Europe and a low-pressure system over the Atlantic, unusually warm to hot subtropical air reached Luxembourg in the second decade. Monthly mean air temperatures in September rose 2.8 K above the long-term average. Numerous low-pressure systems with unsettled weather dominated October. Thus, air temperatures in Luxembourg were only slightly above the normal (0.4 K). The persistent influence of high pressure over southeast Europe blocked central Europe from Atlantic low-pressure systems during November. This weather pattern led to a monthly mean air temperature of 6.6 °C, deviating plus 1.9 K from the long-term average. During December, Atlantic low-pressure systems alternated between periods of moderately cold and unusually mild weather, resulting in a positive anomaly of 2.0 K.

**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 2020.

2020	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
<b>Air temperatures (°C)</b>	3.6	5.2	6.2	12.9	13.7	16.8	18.7	21.2	16.7	9.9	6.6	3.8	11.3
<b>Normals (1981-2010)</b>	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
<b>Anomalies (K)</b>	2.8	3.6	1.0	4.2	0.7	0.9	0.5	3.5	2.8	0.4	1.9	2.0	2.0
<b>Normals (1961-1990)</b>	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
<b>Anomalies (K)</b>	3.6	4.1	2.2	5.4	1.9	1.9	1.8	4.8	3.3	0.8	2.8	2.8	3.0

### Extremes and peculiarities

Air temperatures in 2020 (11.3 °C) were unprecedented. This year was the warmest year since weather records began in 1947 at Luxembourg/Findel-Airport. Together with 2014 and 2018 spring 2020 was the warmest spring (10.9 °C) since 1947. April 2020 is the third-warmest April (12.9°C) in station history. These values can be referred to as exceptional. The monthly mean air temperature of 21.2 °C recorded during August 2020 at Findel Airport is the second-highest value ever recorded since 1947. The maximum air temperatures, recorded at Luxembourg/Findel-Airport on September 15 and 16, 2020 (32.2 °C), exceeded the existing absolute record from September 6, 1973 (31.5 °C). This event can be referred to as unprecedented. With maximum air temperatures of 19.8 °C a new station record for the November was reached at Luxembourg/Findel-Airport on November 2, 2020. This maximum air temperatures clearly exceeded the existing absolute record from November 6, 2011 (18.4 °C).

## 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. Monthly precipitation sums are rounded.

### Anomalies with respect to 2019

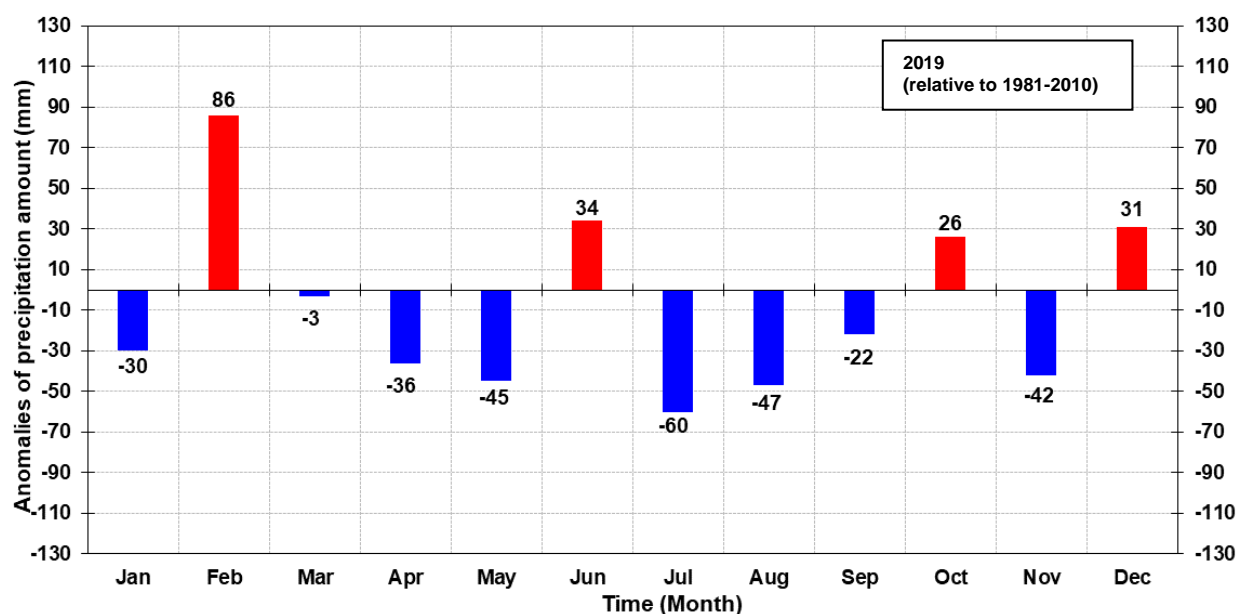
The annual precipitation amount reached 790 mm in 2020. Annual rainfall was about 12.0% lower than the long-term average of 898 mm (1981 to 2010).

### Anomalies with respect to seasons

Seasonal precipitation in winter 2019/2020 amounted to a total of 283 mm at Luxembourg/Findel-Airport, about 25.0% above the long-term average (226 mm). In spring the precipitation amount reached 122 mm. The seasonal precipitation total was about 41% lower than the 1981 to 2010 climate normal (206 mm). Seasonal precipitation in summer amounted to just 153 mm, significantly below the normal (32%) for the 30-year period from 1981 to 2010 (226 mm). MeteoLux recorded 201 mm in autumn, thus slightly below the normal (239 mm) at Findel-Airport. The number of precipitation days ( $\geq 0.1$  mm) in winter 2019/2020 reached 62, significantly exceeding the climate normal (48 days). During spring the precipitation days reached just 27 days, clearly below the long-term average (44 days). In summer the number of precipitation days (34) was below the climate normal (40 days). The number of precipitation days in autumn 2020 summed up to 47, thus close to the normal (46 days).

### Anomalies with respect to single months

With the exception of February, June, October, and December precipitation amounts throughout 2020 were all lower than the climate normal. Significant precipitation deficits occurred in April and May as well as from June to September (Figure 2, Table 2).



**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 2020. Observational days for precipitation are based on daily sums between 06 UTC and 06 UTC of the following day.

Due to the more northern track of the low-pressure systems Luxembourg was generally drier than average. In January 47 mm of precipitation were measured, nearly 39% below the climate normal. A long series of powerful Atlantic low-pressure systems that swept incessantly across northern Europe brought severe storms and unusually heavy precipitation to central Europe. In February 149 mm of precipitation were measured, nearly 137% above the climate normal. The windy and rainy westerly weather conditions continued into the second third of March. Precipitation amounts in March (66 mm) were roughly equivalent to the normal. Predominant high-pressure in April caused below the average precipitation sums (-36 mm). The impact of extended high-pressure periods caused dry weather during May. Precipitation amounts in May were only 34 mm, thus 57% below the climate normal. Numerous low-pressure systems throughout June caused precipitation amounts to rise about 42.5% above the long-term average. During July a high-pressure ridge stretched from France through central Europe, causing extended dry periods. Thus, precipitation amounts in July were 60 mm (85%) below the climate normal. Due to the extensive high pressure in parts of August the dry conditions continued in August the precipitation amounted to only 28 mm at Findel Airport, nearly 63% below the normal. Predominant high-pressure in September caused below the average precipitation sums (-22 mm). From the last decade of September Atlantic low-pressure systems prevailed and caused unsettled weather for some weeks. Precipitation amounts in October were about 30% above the climate normal. Again, prevailing high-pressure periods in November caused dry weather with precipitation sums about 55% below the long-term average. Precipitation amounts in December reached 118 mm, thus 36% above the normal.

**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 2020. Observational days for precipitation are based on daily sums between 06 UTC and 06 UTC of the following day.

2020	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
<b>Precipitation amount (mm)</b>	47	149	66	22	34	114	11	28	54	113	34	118	790
<b>Normals (1981-2010)</b>	77	63	69	58	79	80	71	75	76	87	76	87	898
<b>Anomalies (mm)</b>	-30	86	-3	-36	-45	34	-60	-47	-22	26	-42	31	-108
<b>Normals (1961-1990)</b>	71	62	70	61	81	82	68	72	70	75	83	80	875
<b>Anomalies (mm)</b>	-24	87	-4	-39	-47	-32	-57	-44	-16	38	-49	38	-85

### Extremes and peculiarities

February 2020 (148.7 mm) was the second-wettest February since 1947. July 2020 (10.9 mm) ranked on number three of the driest months at Luxembourg/Findel-Airport since station history in 1947. This precipitation amount can be considered as exceptional.