16/01/2023

**Information on the climate in 2022**
Station: Luxembourg/Findel-Airport (WMO 06590, 376.12 m, a.s.l.)
Reference period: WMO normal period 1991 to 2020 (tables: 1981 to 2010 and 1991 to 2020)

## 1. Air temperature

### Anomalies with respect to 2022

The annual mean air temperature for 2022 calculated by MeteoLux for its station at Luxembourg/Findel-Airport was 11.2 °C. The deviation of the annual mean air temperature from to the average of the reference period from 1991 to 2020 resulted in a positive anomaly of 1.4 K. The total number of 63 frost days was only slightly below the long-term climate normal (64.4 days). Nine ice days occurred in 2022 (normal = 14.1 days). In 2022, 68 summer days and 15 hot days occurred, significantly above the normal. The long-term average for summer days is 38 days and for hot days it is 7.4 days.

### Anomalies with respect to seasons

The winter 2021/2022 showed a mean air temperature of 3.4 °C, deviating plus 1.5 K from the climate normal. During this winter the days with frost (40) were below the normal of 46 days of the reference period 1991–2020. The number of 5 ice days was below the normal value of 12.8 days. Spring mean air temperature (10.3 °C) was 0.7 K below the normal (9.6 °C). The spring season was characterized by 17 frost days and no ice days. The number of frost days was above the long-term average (10.5 days). Six summer days were observed in spring. The normal for this period is 3.5 days. The summer mean air temperature in 2022 was 20.1 °C, deviating by plus 2.2 K from the long-term average (17.9 °C). During this season 57 summer days (climate normal 31.5 days), 15 hot days (climate normal 7.2 days), and one very hot day occurred. The seasonal average in autumn was 11.3 °C, which is 1.5 K above the long-term average (1991–2020). During autumn no summer days (climate normal 3 days) and frost days (climate normal 7.8 days) occurred.

### Anomalies with respect to single months

In 2022, the majority of months except for April and September were above the 1991–2020 normal (Figure 1, Table 1).

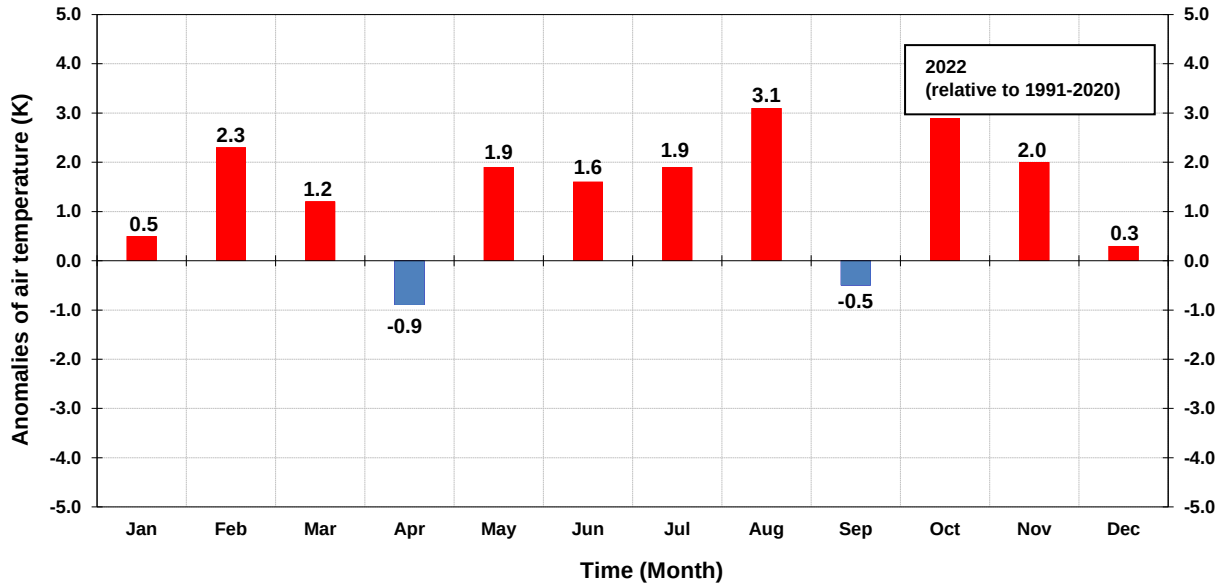


**Fig. 1**: Anomalies of monthly mean air temperatures (K) relative to the WMO normal period from 1991 to 2020 at Luxembourg/Findel (WMO 06590, 376 m, a.s.l.) in 2022.

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After a few days of unsettled and mild weather in the beginning of January, high air pressure over Western Europe often brought dreary weather patterns as the month progressed. Monthly mean air-temperatures in January were 0.5 K above the climate normal. Unsettled weather dominated in February. In a westerly flow Atlantic low-pressure systems caused windy and mild weather at the end of the second decade. Thus, monthly mean air temperatures in February were 2.3 K above the 1991-2020 normal. Under the influence of high pressure, relatively dry and cool air reached Luxembourg with an easterly flow in March. Frontal systems approaching the country from the west were blocked. Extensive high-pressure systems over Europe caused mild weather in March. Air temperatures in Luxembourg were 1.2 K above the average. At the transition from March to April the weather pattern changed. Cold polar air masses caused late-winter conditions in western and central Europe during early April. The rest of the month was dominated mainly by high-pressure. However, Luxembourg experienced below-average air temperatures (0.9 K). Southwesterly air masses caused temperatures in May to rise 1.9 K above the long-term average. Persistent high-pressure systems during June and July caused several heat waves. The air temperature in June exceeded the climate normal by 1.6 K, in July by even 1.9 K. High pressure continued to dominate in August, causing temperatures to rise 3.1 K above the normal. The first part of September was warm, though it became unsettled during the rest of the month. Air temperatures were 0.5 K below the average. Unsettled weather dominated large parts of October. Extensive low-pressure systems over the Atlantic Ocean and high pressure over Central or Easter Europe caused the advection of mild subtropical air in Luxembourg. Thus, air temperatures in Luxembourg were significantly above the average (2.9 K). Troughs of low pressure dominated the weather during most of November, causing temperatures to rise 2.0 K above the climate normal. Persistent high pressure over Europe caused a cold spell during the first weeks of December. By mid-month the general weather situation changed across Europe and mostly Atlantic lows with unsettled weather dominated. However, air temperatures in Luxembourg were slightly above the average (0.3 K).

**Table 1**: Monthly and annual mean air temperatures (°C) as well as anomalies (K) relative to the WMO normal periods from 1991 to 2020 and from 1981 to 2010 at Luxembourg/Findel (WMO 06590, 376 m, a.s.l.) in 2022.

| 2022 | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Air temperatures (°C)** | 1.9 | 4.5 | 6.9 | 8.7 | 15.4 | 18.3 | 20.6 | 21.5 | 13.8 | 12.8 | 7.2 | 2.6 | 11.2 |
| **Normals (1991-2020)** | 1.4 | 2.2 | 5.7 | 9.6 | 13.5 | 16.7 | 18.7 | 18.4 | 14.3 | 9.9 | 5.2 | 2.3 | 9.8 |
| **Anomalies (K)** | 0.5 | 2.3 | 1.2 | -0.9 | 1.9 | 1.6 | 1.9 | 3.1 | -0.5 | 2.9 | 2.0 | 0.3 | 1.4 |
| **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)** | 1.1 | 2.9 | 1.7 | 0.0 | 2.4 | 2.4 | 2.4 | 3.8 | -0.1 | 3.3 | 2.5 | 0.8 | 1.9 |

## Extremes and peculiarities

The year 2022 was the second warmest year (11.2 °C) after 2020 in Findel-Airport station history since 1947. The monthly mean air temperature of 15.4 °C recorded during May 2022 at Findel-Airport is the third-highest value together with 2017 measured since 1947. This event can be referred to as exceptional. Summer 2022 was unusually warm in Luxembourg. It was the second warmest summer after 2003. The monthly mean air temperature in August (21.5 °C) was the second highest ever recorded at Findel-Airport. This event can be referred to as exceptional. In October the temperature was unprecedented. The monthly mean air temperature reached 12.8 °C, together with October 2006 the highest temperature ever recorded at Findel-Airport since 1947. Autumn 2022 was unusually warm in Luxembourg. It was the third-warmest autumn in station history (11.3 °C). The absence of frost days during autumn occurred the third time since 1947. The maximum air temperature of 15.7 °C recorded on the 31st of December 2022 at was the highest air temperature ever recorded in December since 1947. This event can be referred to as exceptional.

## 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 2022

The annual precipitation amount reached 637.2 mm in 2022. Annual rainfall was about 23.3% lower than the long-term average of 831.3 mm (1991 to 2020). The total number of 138 precipitation days (≥ 0.1 mm) was significantly below the long-term climate normal (177.4 days).

### Anomalies with respect to seasons

Seasonal precipitation in winter 2021/2022 amounted to a total of 199.2 mm at Luxembourg/Findel-Airport, about 9.7% below the long-term average (220.6 mm). In spring the precipitation amount reached 88.8 mm. The seasonal precipitation total was about 50% lower than the 1991 to 2020 climate normal (179.3 mm). Seasonal precipitation in summer amounted to 74.6 mm, significantly below the normal (66%) for the 30-year period from 1991 to 2020 (217 mm). MeteoLux recorded 267.8 mm at Findel-Airport in autumn, thus well above the normal (214.5 mm). The number of precipitation days (≥ 0.1 mm) in winter 2021/2022 reached 45, thus below the climate normal (51 days). During spring the precipitation days reached 24 days, significantly below the long-term average (41.5 days). In summer the number of precipitation days (23) was significantly below the climate normal (40 days). The number of precipitation days in autumn 2022 summed up to 49, thus slightly above the normal (45 days).

### Anomalies with respect to single months

With the exception of February, September, October and November precipitation amounts throughout 2022 were all lower than the climate normal. Significant precipitation deficits occurred in July and August (Figure 2, Table 2).

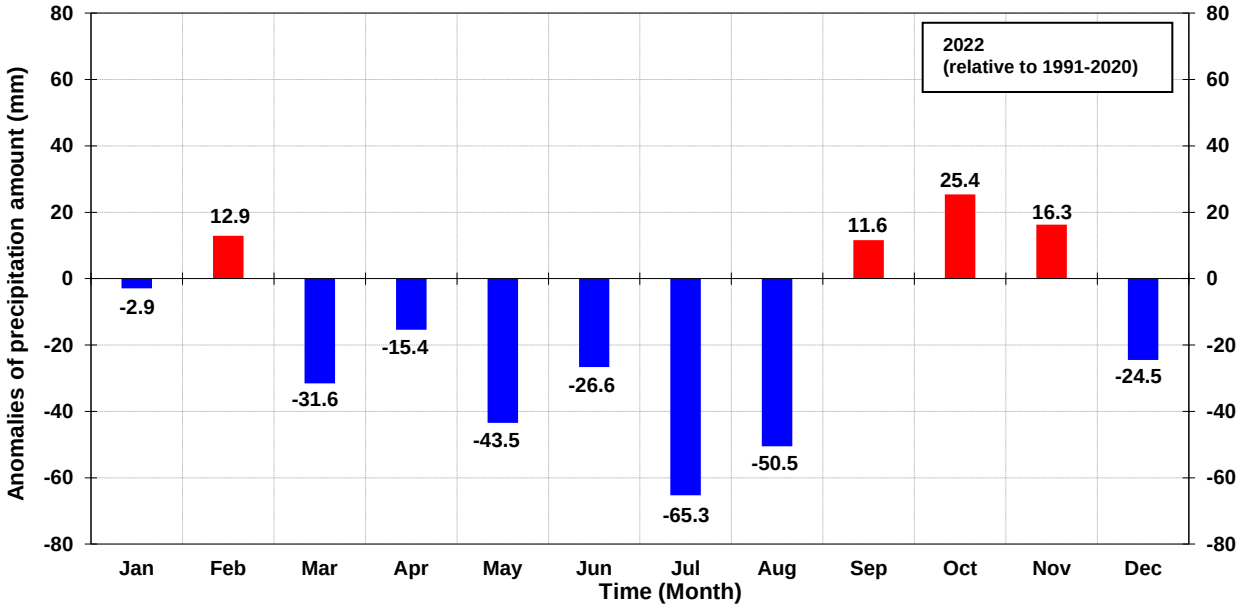


**Fig. 2**: Anomalies of monthly precipitation amount (mm) relative to the WMO normal period from 1991 to 2020 at Luxembourg/Findel (WMO 06590, 376 m, a.s.l.) in 2022. Observational days for precipitation are based on daily sums between 06 UTC and 06 UTC of the following day.

After a few days with heavy precipitation in the beginning of January, high air pressure over Western Europe often brought dry periods for the remainder of the month. In January 68.6 mm of precipitation were measured, just 4% below the climate normal. Unsettled weather dominated in February. Due to the westerly flow of Atlantic low-pressure systems, wet weather periods prevailed, resulting in precipitation amounts of 72.4 mm and about 12.9 mm above the long-term average. High pressure was predominant in March. Luxembourg was much drier than the average. Precipitation amounts in March were 25.0 mm, thus 59% below the climate normal. A change of the weather pattern occurred in early April when a cold weather with snow returned to Luxembourg. For the remainder of the month high-pressure with dry periods dominated. Thus, precipitation amounts at Findel Airport were about 31% below the climate normal. Precipitation amounts in May reached only 29.8 mm, thus 59% below the long-term mean. The persistent high-pressure over large parts of Western Europe during June and most of July caused a drought. Whereas precipitation sums in June were only 35% below the normal, July was exceptionally dry with precipitation about 91% below the long-term average. Also in August, high pressure dominated Western Europe. The continuation of high pressure over Western Europe in August caused below the average precipitation sums as well (-50.5 mm). During September the weather in Luxembourg was more unsettled and autumnal. Thus, precipitation amounts were 78.2 mm, 11.6 mm above the climate normal. Extensive low-pressure systems over the Atlantic Ocean caused unsettled weather in October. Precipitation sums exceeded the climate normal by 25.4 mm. Troughs of low pressure continued to dominate the weather during most of November, causing above the long-term average precipitation sums (+16.3 mm). High-pressure systems in the first two decades of December caused low precipitation rates. Deep Atlantic low-pressure systems with frontal precipitation approached Luxembourg, mostly in the second half of December. Precipitation amounts at Findel Airport were only 65.0 mm in December, thus about 27% below the climate normal.

**Table 2**: Monthly and annual precipitation amount (mm) as well as anomalies (mm) relative to the WMO normal period from 1991 to 2020 and from 1981 to 2010 at Luxembourg/Findel (WMO 06590, 376 m, a.s.l.) in 2022. Observational days for precipitation are based on daily sums between 06 UTC and 06 UTC of the following day.

| 2022 | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Precipitation amount (mm)** | 68.6 | 72.4 | 25.0 | 34.0 | 29.8 | 46.4 | 6.8 | 21.4 | 78.2 | 101.6 | 88.0 | 65.0 | 637.2 |
| **Normals (1991-2020)** | 71.5 | 59.5 | 56.6 | 49.4 | 73.3 | 73.0 | 72.1 | 71.9 | 66.6 | 76.2 | 71.7 | 89.5 | 831.3 |
| **Anomalies (mm)** | -2.9 | 12.9 | -31.6 | -15.4 | -43.5 | -26.6 | -65.3 | -50.5 | 11.6 | 25.4 | 16.3 | -24.5 | -194.1 |
| **Normals (1981-2010)** | 76.6 | 62.5 | 69.1 | 58.2 | 78.5 | 79.9 | 71.0 | 75.4 | 76.3 | 86.8 | 76.0 | 86.7 | 897.0 |
| **Anomalies (mm)** | -8.0 | 9.9 | -44.1 | -24.2 | -48.7 | -33.5 | -64.2 | -54.0 | 1.9 | 14.8 | 12.0 | -21.7 | -259.8 |

## Extremes and peculiarities

July 2022 (6.8 mm) was the third-driest July at Findel Airport since 1947. This value can be referred to as exceptional. Summer 2022 was the driest summer (74.6 mm) in station history. This value can be referred to as unprecedented.